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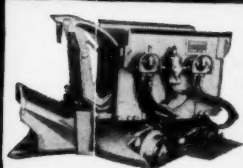
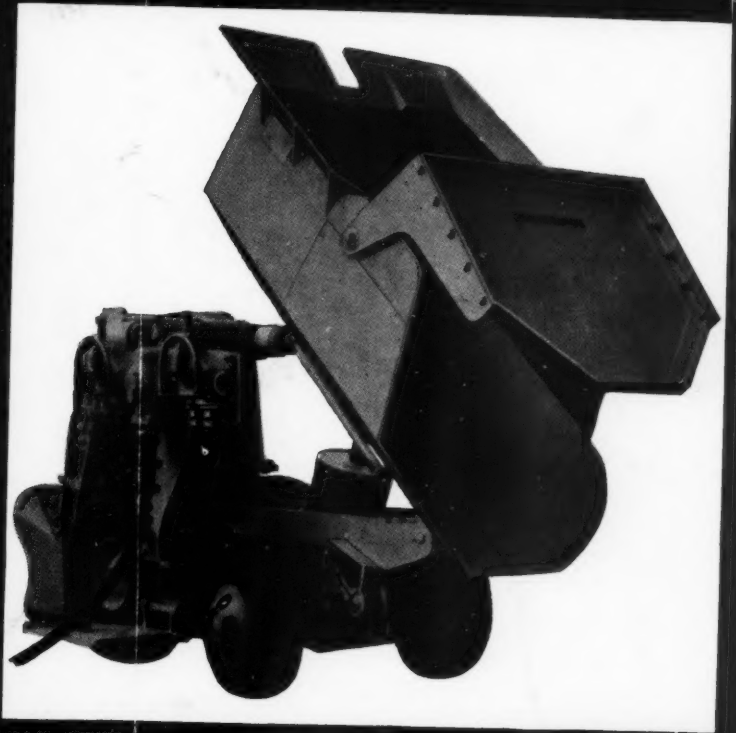
The Mining Journal

LONDON, JULY 22, 1960

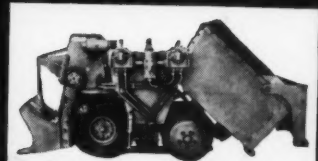
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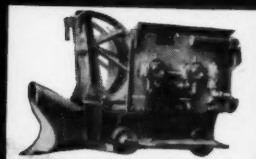
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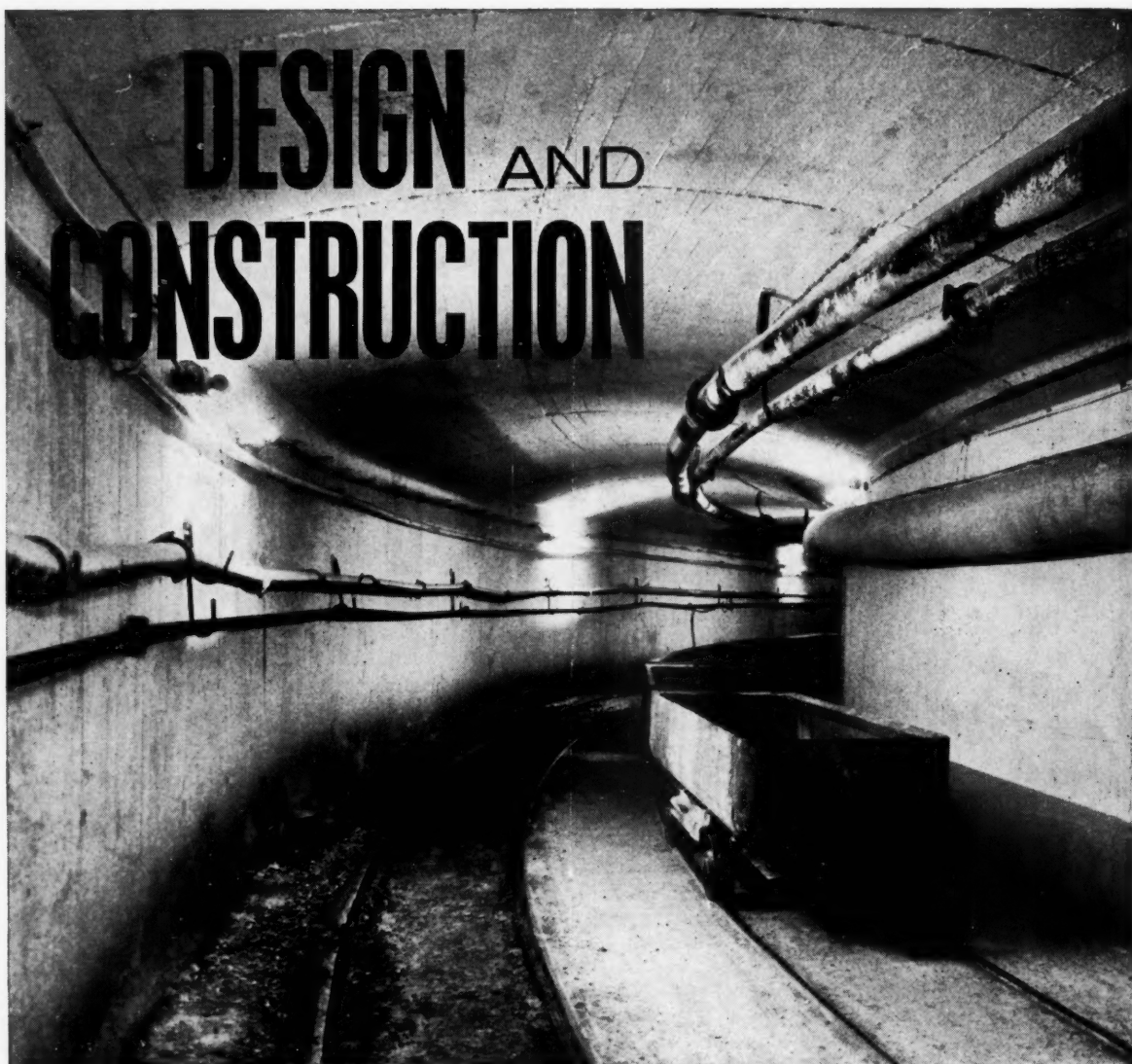
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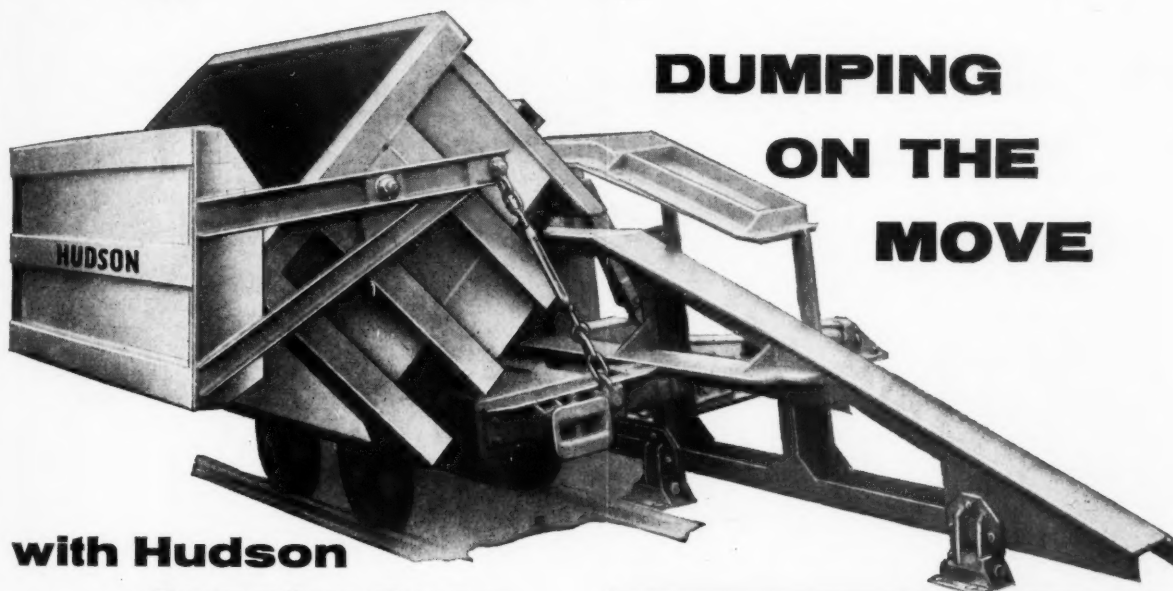
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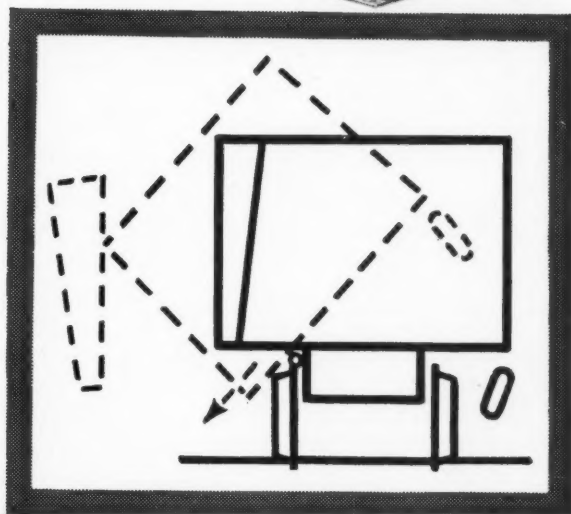


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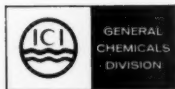
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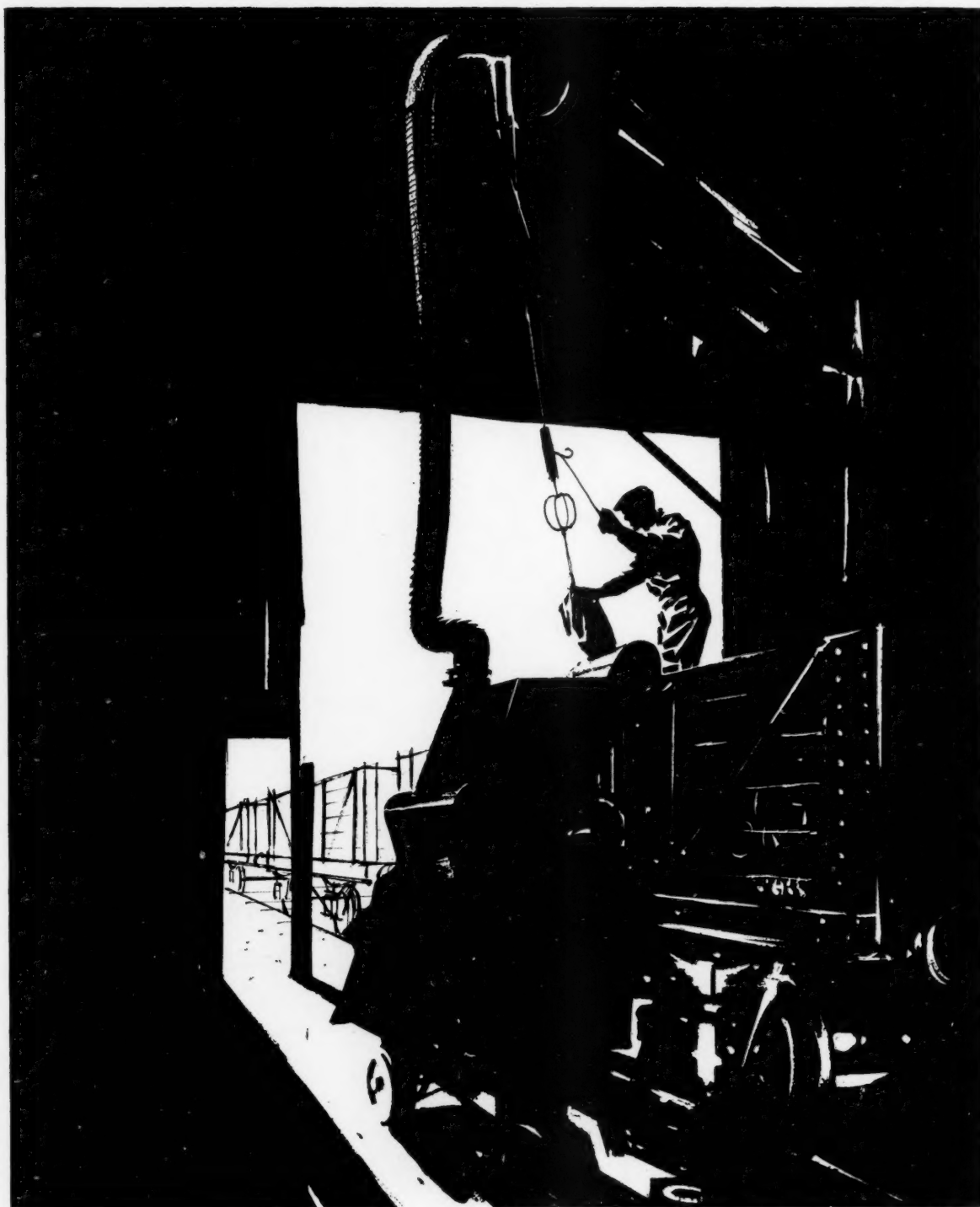
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The Mining Journal

London, July 22, 1960

In this issue . . .

Does the Government Mean Business ? ...	91
Expansion of India's Coal Production ...	93
Recent Developments in World Lead and Zinc Markets ...	94
The Electric Wheel Drive in Open Pit Mining ...	96
Diamonds in the Soviet Union ...	98
Machinery and Equipment ...	99
Mining Miscellany ...	101
Survey of Canadian Mining Projects ...	102
Metals and Minerals ...	103
London Metal and Ore Prices ...	103
Mining Finance ...	105
Full-Scale Shaft Sinking at Harties ...	106
Publications Received ...	106
Company Meetings and Announcements ...	107

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Does the Government Mean Business?

THE one cheering thing about the Government's measures to restrict credit and raise interest rates is that they do appear to represent action in anticipation of balance-of-payments troubles ahead rather than a salvage operation after the event. What these troubles are, it is not difficult to see.

In Europe, the development of the Common Market promises to lead to the gradual integration of industrial enterprise in Western Europe on a scale which will greatly facilitate competition in world markets. In the United States many industrial units have long since reached a size which will comfortably support an export organization. Another source of competition threatens from Japan where, although the home market is not so large, its export strength derives from its low labour costs. Sooner or later the challenge from some of the older Commonwealth countries and others such as Brazil will also have to be reckoned with.

Against this background it is not surprising that the Treasury's recent monetary measures should have now been followed up by a new export-to-live appeal to industry, which the Board of Trade will be promoting through this autumn and which the Prime Minister launched in an address to industrial leaders at the beginning of this week.

The Government's exhortations on this occasion are being directed primarily at the middle-sized and the small firms, many of which have not as yet applied themselves to exports but, the Government clearly hopes, will feel increasingly minded to do so if some of the steam can be taken out of the home market in which competition in any case seems likely to be intensified as Britain's tariffs are progressively lowered or eliminated.

Manufacturers supplying the home mining market have, of course, been experiencing conditions of restricted demand and growing competition for some two years now, and are probably more receptive than some other sections of industry to the need for diversifying into export markets. As, moreover, many of the manufacturers supplying this market come into the category of small and medium-sized firms, to whom the Government is at present appealing, it could well be that mining machinery exports provide a useful case study in what is, and is not, being done by British manufacturers.

One thing which would undoubtedly emerge from such a study is that the Government is by no means blameless in the eyes of the mining machinery manufacturer. Broadly, his complaints would come under three heads. First, he feels he is having to compete with exports from other countries which one way or another are receiving a greater measure of government assistance than are those from Britain—whether by way of financing of long term credit, or by barter agreements and other package deals, or even by direct subsidies or tax reliefs.

Secondly, he is conscious of the absence of British mining consultants in many of the under-developed countries and wonders why the British consultant alone continues to have to charge economic fees for his services in such countries, in competition with those from other industrialized countries.

Thirdly, he feels strongly that much of the export market intelligence circulated by the Board of Trade reaches the manufacturer too late to be acted on and that the other departments which should be helping the exporter—such as the Foreign Office, the C.R.O. and the Colonial Office—just are not export minded and rightly or wrongly are still suspect of regarding commerce as something not quite nice, which (thank goodness!) is not really their concern. The mining machinery manufacturer cannot help but contrast this apparent attitude with that of the Americans who in many cases even go to the lengths of having minerals attachés (usually U.S. Bureau of Mines men) at their chancelleries or consulates.

The Government would no doubt reply first that export subsidies and uneconomically long-term credits serve only to emaciate the current earnings from exports and secondly that the Government is not in business and that British industry cannot expect, and indeed would not wish, to be spoonfed with its export opportunities.

The truth, of course, lies somewhere in between. So far as Whitehall is concerned there is no doubt that closer liaison between the Board of Trade on the one hand and the Foreign Office, the C.R.O. and the Colonial Office on the other, could result in considerably earlier and more positive intelligence being passed back to London. For example, we refer elsewhere in these columns to the technical aid which the Indian coal mining industry is seeking from Britain and other countries. (See also lead note in *M.J.*, May 13, 1960.)

The N.C.B. did in fact respond to India's request for technical aid by sending its Director-General of Production to India on a preliminary investigation. We have as yet no knowledge of the outcome of this initiative and it may well be that it will turn out satisfactorily, but whatever the outcome, our point is that here was a tremendous opportunity which could well lead to substantial consequential sales of British capital equipment, and that it was known that India was making similar approaches to a number of other countries. In these circumstances is the Government satisfied that there was sufficiently close and immediate liaison between the C.R.O. and the Board of Trade and equally that sufficiently urgent representations were made to the N.C.B. to ensure that this opportunity of making British coal mining know-how available overseas should not be lost either through lack of attack by the N.C.B. itself or lack of political support from the High Commissioner's office or the Board of Trade?

Accusations of lack of attack and co-ordination over exports either at home or overseas can, of course, be made with equal force and greater justification in respect of many British manufacturers who pay lip service to the idea of exporting but who become disheartened at finding both the expense and effort involved so infinitely greater than in the home market. Two and a half years ago, with N.C.B. purchases still at a very high level, this criticism could with justice have been made of quite a number of manufacturers supplying the mining industry. Today this picture has altered considerably as practically every such manufacturer has been compelled to diversify away from N.C.B. markets. Some admittedly have found refuge in other home markets, but, for many, losses on the N.C.B. market have had to be made good in the export field.

Some of these firms have only come to take an interest in exports within the last two years or so, yet the nature

of mining is such that it is extremely difficult to get into overseas markets at all quickly. Moreover, for many items of mining machinery, after sales service and prompt spares availability are more important than any marginal technical superiority which the machine itself may enjoy.

Except in the case of big surface installations, such as a complete washery or smelter, these considerations militate against an isolated sale in a particular market being profitable of itself, or indeed against it being made at all. Essentially, the manufacturer selling to mining has got to select the countries on which he is going to concentrate and must then expect to have to devote perhaps three to five years in cultivating these markets before his sales promotional expenditure begins to pay dividends.

This kind of approach is the antithesis of the "hit and run" tactics adopted by some firms which rely on sporadic forays by senior personnel who, because of other commitments, often cannot personally give the market possibilities which they have identified a sufficiently intensive follow up and lack the quality of on-the-spot representation to clinch the deal.

As we have repeatedly stressed in these columns the world demand for mining machinery and equipment has increased tremendously in the past decade and shows every sign of continuing to increase at no less a tempo in the next. Britain, however, has not been obtaining anything like her share of this expanding market.

Manufacturers, who wonder where these markets may be, might usefully ponder on the vast increase in minerals output from China and that the other Iron-Curtain countries have been steady net importers from the West. Again it is now obvious that India is preparing to embark on further large investments in mining.

Finally, we would draw attention to a most enlightening table (reproduced on page 102) which appeared in a recent issue of *The Northern Miner* of Toronto and which summarizes capital projects in hand and in prospect across Canada, valued in the aggregate, at more than £500,000,000. Canadian mining has not been having an easy time this past year or so. Nevertheless, it is clear from this tabulation that the industry is still engaged on very substantial capital expenditure projects.

Canada is regarded—and not without reason—by the British manufacturer as a particularly tough market, which is largely monopolized by American salesmanship. Even so, a few British manufacturers have successfully established themselves there. Moreover, it so happens that at the moment the popularity of things American is at an exceptionally low ebb with the Canadian mining industry by virtue of the lack of sympathy which Washington has been showing over such matters as lead/zinc quotas, long-term uranium contracts, and of course, the perennial inclination to regard Canadian aluminium production as a stand-by reserve for American industry which can be switched on and off at will. If ever there was a time when overtures from British mining machinery manufacturers were likely to be sympathetically received in Canada, this is it.

China, India and Canada are no more than examples of a world wide trend. The real trouble with the overseas mining machinery market in short is that opportunities exist in too many directions so that the average medium-sized or small firm simply has not got the senior sales and design staff available to cover them all. It was partly a recognition of this state of affairs and partly a recognition of the lack of liaison between the manufacturer and the Government which caused the British Mining Equipment Export Association to come into being (see *The Mining Journal*, June 3, 1960).

This Association, which at present has a membership of some 35-40 firms, has still some way to go to achieve a sufficiently widely based support from the manufacturers to have either the revenue or the authority to give full effect to its aims. It has, however, been brought into being at a particularly appropriate time in the context of the Government's present export appeal to the smaller firm. (Manufacturers who are not yet acquainted with the aims of the Association may like to know that these have been set out in a booklet which is now available from the Acting Director, B.M.E.E.A., Boundary House, 7/17 Jewry Street, London, E.C.2. Phone: Royal 0141.)

One of the things which the manufacturer, not yet established overseas, needs to know is the probable long-term pattern of the growth of the mining industry in various parts of the world as a basis for selecting the areas upon which he will first concentrate his effort. The cost of such a survey would be quite uneconomic to any but the very largest groups, but it could well be that conducted through the Association or some similar agency the job could be done for manufacturers as a whole for a fee which all could afford.

Again, Government export campaign or no, many manufacturers will remain unconvinced that, if left to itself, the Government, or rather its various (and in the export context seemingly often unrelated) departments, will give the mining machinery industry effective aid, even within the Government's definition of what this aid should extend to. There is, therefore, everything to be said for establishing a body which can make representations to the Government on all matters affecting exports to the mining industry.

If we in Britain are really to tackle exports as a nationwide operation, there is, in our view, one other important avenue which should be examined in respect of the mining industry and also, we would imagine, in respect of other industries which have been developed overseas by British capital. In the case of mining, there is no doubt that in many countries members of the British Overseas Mining Association could be of great assistance to the British manufacturer. Aside from being in themselves a major outlet for British mining machinery exports, the members of B.O.M.A. in many countries are working in close contact both with Government and with other mining interests in those countries and it is inevitable that the companies' men on the spot should know a great deal about what is likely to develop in the way of future mining activities in which their own companies would be in no way concerned, but which would nevertheless be of real interest to British manufacturers if channelled back through the British Mining Equipment Export Association.

Obviously, such an arrangement is not without its difficulties. Why should a mining company worry about the sales problems of another industry? What about members of B.O.M.A., who may themselves be financially interested in companies manufacturing mining machinery in other Commonwealth countries? Nevertheless, even if London is no longer the world centre of mining finance, its connections are still sufficiently influential and widespread to be able, given proper liaison, to provide the manufacturer with a most important source of market intelligence. Nor is there any reason why such services should go unremunerated.

What it boils down to is this. How serious is Britain's prospective balance of payments position, and how serious are both the Government and industry about dealing with it. If we have all got to pull together, then one of the essential functions of Government is to ensure

that the necessary co-ordination is taking place. This does not mean Government direction but it emphatically means Government awareness and informal encouragement. Experience has shown that given a crisis, industry will respond. It has yet to be shown whether, given an impending crisis, our Government is capable of making industry act so as to ward it off.

EXPANSION OF INDIA'S COAL PRODUCTION

Foreign experts, including those of Britain, West Germany, France, Soviet Union and the United States, are being invited by the Government of India to advise it on ways and means of stepping up coal production from 60,000,000 tons under the second five-year plan to 97,000,000 tons by the end of the third plan. Before deputing their technical experts, each of these governments has agreed to send a top official to have preliminary discussions with the government and the coal industry in India on the magnitude of the project. (See *M.J.*, May 13, page 547.)

It has already been decided that 19,000,000 tons out of the additional 37,000,000 tons of coal to be produced in the third plan will be earmarked for the public sector. It has been estimated that the coal development programme under the third plan will cost about Rs1,400,000,000.

The private sector of the coal industry in India has not as yet indicated whether it would be in a position to raise 16,000,000 tons earmarked for it under the third plan. It has been suggested that it would not be possible for the private sector to undertake this responsibility unless it is allowed to exploit contiguous coal areas and financial assistance is given on a liberal scale. Discussions were held recently between the government and representatives of the coal industry and an early decision is expected to be taken about the two issues raised by the private sector.

Meanwhile, Mr. A. B. Guha, coal mining adviser, is being deputed by the Government of India to visit a number of countries, including the Soviet Union, Poland, France and the United Kingdom to study the latest techniques of coal production in these countries and submit a report. During his stay in Warsaw, Mr. Guha is expected to select equipment for a coal washery and mining operations, proposed to be procured with the Polish credit granted to India recently.

According to the draft of the third five-year plan, though the target of 97,000,000 tons is not likely to be achieved in full by the end of the plan, the necessary investment required for attaining production of this order will be made by the government. The increase in the third plan, states the draft, will call for the opening of a number of new mines in virgin areas and this will entail a great deal of effort and capital investment.

The most important objective of the coal programme in the third plan will be to ensure adequate supplies of coking coal required for the steel industry and of high-grade non-coking coal for railways and certain other industries. The exact requirements of the steel industry, the sources of supply and the steps to be taken to ensure their full availability are now being gone into by a special committee.

According to Sardar Swaran Singh, Minister for Mines, Steel and Fuel, Government of India, the production of coal in the country has gone up by 25 per cent during the second five-year plan period. At the beginning of the second plan, India was producing only 38,000,000 tons of coal against 50,000,000 tons being produced at present.

Lead and Zinc—I**RECENT DEVELOPMENTS IN WORLD LEAD AND ZINC MARKETS**

THE ores of lead and zinc are unevenly distributed throughout the world and all countries are not equally well supplied with their own mines. Some countries, such as Africa, Australia and Canada, have resources in high grade ore which allow production of much more than they can use. Others, such as Great Britain, India, Japan and the United States, are unable to provide for their consumption from domestic ores and so are compelled to import. Consequently, there is much traffic in lead and zinc in various forms from one country to another and there is every expectation that this will increase. International trade is thus an integral part of the lead-zinc industry, and international co-operation is essential for its well-being. This latter fact is receiving growing recognition and I submit that the most important single international development in the industry in recent years is the increase in co-operation that has been brought about.

Increasing Co-operation

For many years there has been considerable freedom between producers to exchange technical information relating to methods of mining, concentrating, smelting and refining. This is good, and it was encouraging to hear recently that the Russians may open their lead and zinc mines and smelters to visitors from certain Western countries on a reciprocal basis. I believe that such exchange on the technical level is beneficial not only for the direct results but also in a broader sense.

At the United Nations conference held in New York about a year ago, steps were taken to set up the International Lead-Zinc Study Group. At the same conference in New York there was frank discussion of the difficulties facing the industry because of the over-supply situation and you also know how individual producers recognized the problem and made various adjustments to deal with it. The benefits of the resulting action to both producers and consumers are now apparent to all and it will suffice for me to point out that at the recent Geneva meetings of the Study Group it was recognized that the problem has been resolved with the zinc market now in an approximately balanced supply-demand position. Improvement was also seen in the lead situation but some over-supply was still in evidence, requiring attention for a time.

It is clear that the Study Group has amply demonstrated its value and I hope that it will continue on a permanent basis. It seems to me that such an international group could provide a continuing forum for the discussion of major industry problems which have international implications. It is also in an excellent position to set up committees which could investigate and report on matters of mutual concern. Unbiased, factual reports thus pro-

vided could be the basis for recommendations to governments for appropriate action. One area for such study might be the effects on the lead-zinc industry of governmental restrictions and other legislative action regulating international trade.

Trade Associations

Another area of increasing international co-operation that I should like to discuss is in the trade associations, of which I can mention only one or two. The American Zinc Institute itself now has many associate members representing an important part of the industry outside the United States. Associate membership allows full participation and representation on the Industry Development Committee and pertinent subcommittees, an arrangement which in my experience is entirely satisfactory.

In the other direction, I think of the Zinc Development Association, whose headquarters are in London, England. This Association formerly obtained its support from the United Kingdom, Australia and Canada, and was mainly concerned with promoting the use of zinc within the United Kingdom, although its literature was also circulated in Australia and Canada. Recently the interests of the Association have been extended to Europe and now there are a number of parallel co-operating associations in various European countries. Still more recently a number of companies in the United States have been contributing to the support of the Association and participating directly in its activities.

The Zinc Development Association includes a number of committees working in specified fields in the United Kingdom and aimed at furthering particular uses of zinc. There are also affiliated groups, such as the Zinc Pigment Development Association, which is planning a co-operative research programme on zinc oxide and lithopone in emulsion paints. Other groups concern themselves with rolled zinc, hot dip galvanizing, analytical techniques and other fields. Among the co-operating European committees, I might mention the European Zinc Producers' Technical Committee.

Research

Another very encouraging evidence of co-operation is in our own AZI and LIA Expanded Research Programme. The sponsors of this programme comprise 24 producing companies representing about half of the world's mine production of lead and zinc from three continents. I understand that other companies not now participating are anxious to join us in this work. I am sure that any such who are active in the lead-zinc industry would be welcomed by the present sponsors. It is also worthy of note that the actual research work sponsored under the programme is being carried out wherever the situation is favourable, regardless of international boundaries.

However, if the industry is to enjoy the full benefits from the research work which we are supporting financially, there are a number of things which we can and should do. The responsibility of producers and fabricators is not ended until research results are translated into commercial products and sold in the markets of the

This is the first of two extracts from a paper presented by R. Hendricks, executive vice-president, The Consolidated Mining and Smelting Co. of Canada Ltd., at a joint session of American Zinc Institute and Lead Industries Association, at St. Louis, United States, on April 7, 1960

world. We must keep in close touch with the research programmes and exploit the results in our own operations and products as may be applicable. We must see that our engineers and technical people are constantly aware of their responsibility to evaluate and apply research findings in this way. In the research and development effort of our individual companies we must plan programmes which will co-ordinate with the expanded programme and further the consumption of lead and zinc.

While there is ground for encouragement in our research work, there is no room for complacency or thinking that we can reduce our efforts. Competition is extremely active and is coming from directions not thought of two or three decades ago. Let me mention just two examples to illustrate what I have in mind. After 12 years of research and development at a reported cost of \$6,000,000, Du Pont Co. now has under construction a plant to manufacture Dycril. This is a new plastic printing plate material which will compete with zinc in lithography and photoengraving. Another plastic developed by Du Pont, Delrin, is threatening zinc in die casting. Delrin is a product of 10 years of research and development, reportedly costing \$42,000,000. To meet this sort of competition will take our best united efforts if zinc and lead are to have the place we want for them in the markets of the world.

Artificial Barriers

It has been stated on good authority that international trade is now generally freer of restrictions than at any time in the last 30 years. This is good, but unfortunately, and particularly as affecting lead and zinc, there are areas where artificial barriers have recently been set up and where various political situations are still a serious hindrance to trade.

First I want to urge that as a general principle industry should try to solve its own economic problems rather than appeal to governments for help. If we, as producers, could get together on an international basis and frankly exchange ideas and discuss the broad industry problems, I believe we would find that many of our ultimate objectives coincide, and that we could work out ways of dealing with our own problems. When cyclical situations of over-supply arise due to decreased demand, lead and zinc mines and smelters throughout the world inevitably suffer hardships and individual countries cannot insulate themselves by government action. What is needed is to take steps that will reduce or eliminate these periods of low demand by keeping consumption buoyant and growing. Experience in recent years indicates that the various interferences of governments have tended to aggravate the cyclical swings, adding generally to the problems of the whole industry. Further, government aid inevitably means government regulation and, in the long run, this leads to government control of industry.

There is no longer a general world-wide shortage of dollars, but a number of countries, particularly in the Far East, still have serious currency difficulties and as a consequence their imports of lead and zinc are closely controlled. As I have already mentioned, some countries foresee this as a long term problem and are therefore discouraging the use of lead and zinc which have to be imported. We can understand this situation and recognize the need for some government regulation. Nevertheless, we feel that freer conditions of trading are normally preferable and certainly better for the lead-zinc industry. Meantime it may be possible for producers in specific cases to accept local currency for sales of metal and use this in some way to finance exports.

Coming closer to home, we still have quotas restricting imports of lead and zinc into the United States. These were established in October 1958 and recent reports indicate that the Administration and Congress have no present intention of removing them. This is so in spite of the many objections that have been raised. For example, last August six major United States lead and zinc smelting companies, representing about one-half of the smelting and refining capacity, issued a statement opposing the quota system. In recent hearings before the United States Tariff Commission domestic smelters testified that a continuation of the quotas is a serious threat to the future of the lead and zinc industry. Our Canadian Government and that of Australia have repeatedly urged their elimination. At the recent meetings of the United Nations' Study Group held in Geneva, delegations voiced concern over the continuation of the quotas and particularly that these restrictions, originally stated to be temporary, might become permanent. It was pointed out that lasting damage might result if such restrictions caused consuming industries to use alternative materials.

Stockpiles

Another point where co-operation is needed is in connection with government stockpiles of lead and zinc. As you know, the United Kingdom stocks of zinc, amounting to about 53,000 tons, are to be disposed of during the next four years. Intentions in this regard were announced at the United Nations' Study Group meetings and views of other participants were invited. This approach and the assurance that disposal would have due regard for market conditions are commendable. In view of the relatively small quantity involved, we may hope that its disposal will not depress markets to any extent and it will be good to have the problem out of the way.

The stockpiles in the United States are, of course, many times larger than those in the United Kingdom. Indeed, the quantities are so great that unwise disposal could disrupt the world industry. They therefore cannot be considered from a purely domestic point of view. This is shown by the fact that during the period around 1956, when stockpiling was at its height, about 10 per cent of the total production of the Free World was being withdrawn from the market. When purchases were abruptly curtailed in 1957, prices deteriorated rapidly and the industry became depressed, a condition from which it is now only recovering.

Stockpiles of lead and zinc may be necessary for strategic purposes to meet possible national emergencies, but if so they should not be released except as necessary for this purpose. Certainly any precipitate action to dispose of the United States Government stocks at this time could have extremely serious effects on the industry. I urge that no further major additions be made to these stockpiles of lead and zinc and particularly that if any future emergency should necessitate release of metal, consultation should first be held with industry on as wide a basis as possible.

For too long industry and governments have overlooked the importance of consumers. At the various meetings and hearings when the needs and claims of different interests are presented and action is urged for their safeguarding, seldom does anyone represent consumers or put in a claim for them. I suggest that it is time that this omission was rectified, for our own well-being if for no other reason. After all, the major task facing our industry is to stabilize and increase world consumption of lead and zinc and this will need careful attention to the interests of consumers.

One of the prime requirements will be to see that adequate supplies of good quality metal are available at reasonable prices. Producers must keep the supply of metal coming out in line with market requirements, in poor times as well as good. We must do our best to maintain reasonable and stable prices and these cannot be considered solely on the basis of local costs. Competition must be recognized, particularly from alternative materials. Unduly high prices may give temporary benefit but experience has shown that in the long run they are detrimental to marketing. On the other hand, very low prices, insufficient to maintain a satisfactory level of world production and good quality, are also harmful.

Similarly, high tariffs, quotas and other such restrictions, though they protect high domestic prices, fail to give adequate consideration to the interests of consumers. Further, such restrictions place manufacturers of products containing large amounts of lead and zinc at a disadvantage when competing with foreign manufacturers. They thus hinder exports and increase the difficulty of balancing international payments. Imbalance of trade is currently causing concern in the United States, and it is also a cause of great concern to us in Canada. I believe that the long-range remedy lies in increasing productive capacity at lower costs, and in encouraging freedom of international trade.

The Electric Wheel Drive in Open Pit Mining

MUCH of the early development of the electric or motorized wheel was done by two American manufacturers—The General Electric Co. and R. G. LeTourneau, both of whom worked independently and at different times on the development of an electric wheel to power a military vehicle requiring great flotation ability for transportation on snow. The very large tyres necessary in this application afforded ample room in which to install the powerful electric motors with their sun and planet drive gears contained in the hubs of the four driven wheels.

During the early 1950's a military requirement to move heavy loads quickly over Arctic snow terrain was successfully met by a train of these motor wheeled units designed and built by R. G. LeTourneau. Later in the 1950's, LeTourneau adapted the electric wheel to massive log handling equipment for which the first of the so-called Jumbo tyres were constructed. In the meantime, the General Electric Co. constructed a set of 4 electric wheels of a design differing from LeTourneau's which were installed in a 4 wheel powered Carryall scraper by the Caterpillar Co. in which power was derived from a Diesel generator unit.

In 1953 LeTourneau sold their earth moving equipment manufacturing business to the Westinghouse Airbrake Co. and signed an agreement to remain out of this business for a period of five years. Their re-entry into the business in May 1958 was with the construction of a large 50-yard Carryall scraper driven by 4 electric wheels and motivated by a generator powered by a 600 h.p. Cummins Diesel engine. This revolutionary equipment was exhibited at the Mining Congress Show in San Francisco in October 1958.

Some time prior to this Anaconda's research staff, casting around for a means of reducing the very high maintenance cost of open pit haulage trucks, explored the idea of an electric truck powered through a trolley. It was known that a practical, electrically operated, trolley-battery truck haulage system was in operation at the International Salt Co.'s mine under the city of Dearborn, Michigan, so that it was not such a far cry to combine this idea with that of the motorized wheel.

Anaconda's conception of an electric truck was one which would have performance characteristics far and above anything obtainable with the most powerful available Diesel engine operated trucks. It should carry a larger load, on a steeper grade and at a higher speed than had heretofore been attempted with conventional equipment. In fact, it was hoped that the load capacity might be doubled, that the negotiable grade might be doubled and finally, that the speed on these grades might be doubled. It was further desired that the unit be automated and that maintenance costs should be materially lowered. Since the power requirement for this unit would be greatly in excess of available Diesel power equipment, consideration was limited to electric drive powered through a trolley. High availability was also well up on the requirement list.

Early last year C. E. Weed, chairman of the Anaconda Co., authorized the construction of a prototype electric wheel, trolley-powered truck, and shortly thereafter an arrangement for its construction was made with the R. G. LeTourneau Co., Inc. of Longview, Texas. The unit was completed in June 1959, and after extensive testing in Texas with loads up to 110 tons, it was partially disassembled and loaded upon three railroad flat cars for shipment to the Berkeley Pit in Butte, Montana. Unfortunately, in the meantime a mine strike occurred before the shipment reached Butte and delayed the operation of the truck for almost 8 months.

Developments in the application of electric wheel traction to open pit earthmoving and haulage units have aroused world-wide interest in mining circles. We have followed them closely in our weekly issues and in *The Mining Journal Annual Review* numbers over the past two years and are therefore pleased to present a summary of events leading up to the commissioning of the first electric wheel truck for open pit haulage duty taken from a paper entitled *The Electric Wheel Drive* delivered to the Coal Division of the American Mining Congress meeting in May this year by E. R. Borchardt, former director of mining research with the Anaconda Co., who was responsible for the idea of applying the electric wheel to large haulage trucks for use in open pit mining.

A 1,600 h.p. electric wheel truck manufactured by R. G. LeTourneau carrying a 75-ton load up a 15 per cent adverse gradient at 12 m.p.h. The site is Anaconda's Berkeley Pit, at Butte, Montana. In the illustration below, the load alone was weighed at 110 tons

Much data will be required to evaluate the capabilities of this truck during the next 10 or 12 months. It is doubtless realized that tyre costs and power supply will be critical considerations. It is hoped that this truck will permit the economical operation of deeper open pits than are now practical, and that it will permit pit layout to conform more closely to the shape of the orebody to result in greatly reduced stripping ratios. For example, iron orebodies in Northern Sweden are frequently long and narrow; operation with conventional equipment requiring the excavation of large amounts of waste to provide roadways of proper grade for efficient operation of Diesel trucks. In other words, instead of spiralling out of a pit on a maximum 7 per cent grade with conventional equipment, an electric truck will negotiate 15 to 20 per cent grades at comparatively high speeds on a straight line exit ramp with the later addition of turns as required.

It is also hoped that the truck will be of value in reducing the haulage distances now required for waste disposal. For example, at Anaconda's Chuquicamata operation, long railroad waste disposal hauls can be abandoned in favour of steep, perhaps 15 per cent, waste dumps, constructed close to the pit on top of former dumps. In certain open pit operations in remote areas such as Central Africa, it is felt that electric truck transportation will have a great economic advantage over Diesel trucks where cheap power is available, and particularly where the transportation of fuel thousands of miles over narrow gauge railroads is now required.

Economic load limits will be governed to a large extent by tyre prices. Tyres now available in the 44.5-45 size are approximately 10 ft. in dia. and weigh almost 3 tons each. The recommended loading per tyre in this size with 63 ply rating and inflated to 70 p.s.i. is 95,550 lbs. at 30 m.p.h. or 107,010 lbs. at 10 m.p.h. These tyres sell for about \$7,000 each, so it is apparent that maximum ultimate service hours and maximum number of re-caps are of vital interest.

With electric wheel traction, wheel spin is virtually eliminated. This has most important effect on tyre life as has the very gradual acceleration possible with the dc motor drive and conversely, with the very gradual deceleration possible with dynamic or resistance braking. The high speed capability of this machine on steep grades reduces the distance to be traversed in moving material from the shovel to the waste dump and from the shovel to the ore disposal point. This, in turn, reduces the time requirement to give a net result of very greatly increased truck duty. Not only has this new truck doubled the operating speed on adverse grades, but it has more than doubled the grade which can be ascended and should ultimately to more than double its load capacity compared to the largest pit trucks now in operation. In fact, it is not unlikely that its ultimate duty will approximate three times that of present equipment.

Shovel and dipper size requirements will naturally increase with increased truck capacity and it is indicated that where a 6yd. 150-B or a 6yd. 1,600 shovel was formerly satisfactory with 14 ton truck units, an 11 or 12 yd. machine will be required with these 75 ton trucks, and, where adaptable, of course, the shovel duty will be correspondingly increased.

The truck is at present hauling 75 ton loads up a specially built 15 per cent roadway which has been equipped with an overhead trolley. This loading on this grade has not required anything close to its maximum rated h.p.—that is, 1,600 or 400 electric h.p. in each of 4 wheels, although its speed on the grade is at the rate of 12 m.p.h. In the loading and dumping areas which are not covered by trolley facilities, the electric



wheel motors are motivated by a 335 h.p. Cummins Diesel engine connected to a dc generator. Auxiliaries are operated by an ac generator connected to the same power source. Loaded trucks move on the level at 10 m.p.h. on the Diesel power. Steering as well as dumping is accomplished with ac motors operating on a rack and pinion.

Some minor changes, such as automating the raising and lowering of the trolley pole, are now being made.

Additional specifications are as follows:

Overall length,	41 ft.
Overall height,	16 ft. 7 in.
Overall width,	14 ft. 7 in.
Empty weight,	56 tons
Struck capacity,	40 cu. yds.
Heaped capacity (3 to 1),	50 cu. yds.
Heaped capacity (1 to 1),	60 cu. yds.

Powered by four 400 H.P. 600 volt dc motors in each of the 4 wheels.

Auxiliary 335 H.P. Cummins Diesel connected to dc and ac generators.

A full Diesel powered LeTourneau unit is available, which is driven by 2-12v71 General Motors engines of 420 h.p. each.



Diamonds in the Soviet Union

AT the Twenty-First Communist Party Congress of the Soviet Union, it was stated that in view of recent diamond discoveries in the Russian Republic of Yakutia, a large diamond-producing industry could now be built up in the U.S.S.R. By 1965 the production of diamonds in the country would be raised to fifteen- or sixteen-fold the 1958 level. This would permit a wide use of industrial diamonds in the machine building industry, in mining and in geological development.

No definite figures are available for the target hoped to be reached in 1965, the final year of the current Seven-Year Plan, but Russian experts, basing their figures on the rough calculation that a country producing 10,000,000 tons of steel needs 1,000,000 carats of diamonds, state that, as in the current year in which Russia will produce about 60,000,000 tons of steel some 6,000,000 carats are required, so in 1965, when national steel output will be up to 90,000,000 to 91,000,000 tons, about 9,000,000 carats will be needed.

Figures planned by the Russian authorities for future diamond production are very high—in a recent statement the Yakutian Republic politician S. Z. Borisov actually urged a twenty-fold increase in diamond output over the 1959-65 plan period. Particular importance is now attached to diamond production in the Soviet Union in its industrial race with the United States, and the advantages of using diamond tools instead of those with substitute materials are to be stressed.

Domestic Production

At present some 98 per cent of all domestic diamond production comes from Yakutia, claimed by Russian spokesmen to be "the biggest diamond mining area in the world". Diamonds were first discovered here in 1949, before which they had been located only in the Urals, and since then they have been found there in a great number of districts. Not until 1954, however, was a really important find made, when Russia's first-ever Kimberley pipe was found in the Daaldynsk district of the Yakutian Republic. Known as the Zarnitsa pipe, this was situated to the east of the Vilyui Basin in an area similar to the Kimberley district in South Africa. Between then and now several dozens of similar diamond areas have been discovered in the Vilyui district and more are being discovered at present; these areas contain oval-form pipes of the Kimberley type, the upper surface of the various pipes ranging from 12,000 sq. m. to 228,000 sq. m. and the angle of inclination of the veins from 80 deg. to 85 deg. The pipes are of dolomite and limestone, the stone top layer being rarely more than 3 m. thick, and in some cases the upper surface of the diluvial stone lies immediately under vegetable growth. All these districts are situated in an area of continuously frozen earth, this going down to a depth of 200 m. Diamond content varies between 0.05 and 0.08 carats per ton in some areas and is as much as 4 carats or more in others. Three diamond mines, each with an annual production of between 1,000,000 and 2,000,000 tons of ore, are reported to be already in operation in the Vilyui Basin, the ore being processed in a large factory in the same area.

Not only small industrial stones are produced in the Siberian areas. In the Mir district a diamond of 32.5 carats

has been found and last year three stones, each weighing some 40 carats, were discovered near the town of Mirny. It is from the Mir area and the Udachnoe district that most jewellery diamonds are mined. The first of these districts stretches over an upper surface of 120,000 sq. m. and the second over 225,000 sq. m., the angle of inclination being between 75 deg. and 90 deg. and reserves being located just below ground level in both cases. Although Kimberley pipes from the Mir area are said to be considerably below the quality of Daaldynsk pipes, Russian geologists claim that all the Yakutian Kimberleys correspond to the classical Kimberleys of South Africa.

Alluvial Deposits

Exploitation is also being carried out in alluvial areas and in conglomerate reserves in Russia. Alluvial deposits were discovered in the Urals and in Irkutsk Oblast before the Yakutian alluvial and diluvial reserves were located. The most important of Russia's alluvial deposits are situated on the beds of rivers and can be mined with dredgers designed for gold-mining use. Shallow rivers in Yakutia are said to have a very high diamond yield, sometimes as much as 10 carats per cu. m. Conglomerates have been found along river-course in Yakutia, particularly along the rivers Vilyui, Markha and Muna, though none of these discoveries is of any great commercial value. Only conglomerate diamonds from the Muna river find possible industrial use.

The quality of Russian diamond types is very divergent. It is claimed that most diamonds from the Urals are of excellent quality and can be used in the manufacture of jewellery. From the same source come many stones which may be used in the production of precision instruments. It is rarely that diamonds of more than 10 carats come from the Ural sites. There is a range of types in the case of Yakutia diamonds. Stones from the various alluvial deposits have a low average weight and are often splintered and only a few of them are suitable for jewellery use. Diamonds from the shallow rivers are of much better quality, weighing often from 6 to 8 carats and sometimes 10 carats. The best diamonds are those from diluvial sources.

Adverse Climatic Conditions

The chief difficulty connected with diamond mining in the main area—the Yakutian Republic—is the question of weather. Here winter temperatures of minus 67 deg. C. occur, and new methods of geological exploration have had to be developed to suit such conditions. The development of the industry is hindered through the problems of building plants and laying mines and erecting dwelling centres and roads in this Siberian climate, as well as by the distant situation of Yakutia. At present transport is limited to a bare five months per year by waterways and six months in the case of roads, while air transport is too expensive. Recent news from other sources indicate that there is now a move to expand Urals production of diamonds, due to these difficulties in Siberia.

Machinery and Equipment

Mobile Coolers for Hot Mines

The reduction of ventilation air temperature by means of a mobile and self-contained cooling plant is reported to be finding increasing application in South Africa's deep gold mines. The coolers are truck mounted and have a refrigeration capacity of 30 tons, capable of cooling 6,000 c.f.m. of mine air. They are manufactured by Trane Co., of La Crosse, Wis., United States.

In operation the plants are trammed to the underground working sites, cooling only that air directly affecting miners and thus eliminating the necessity for large and expensive surface and underground refrigerating systems during development. According to J. L. Clark and Co. Ltd., Johannesburg, the plants have cooled tramping crews several thousand feet back from development faces in Witwatersrand mines, where virgin rock temperatures of 104 deg. F. are recorded at 7,800 ft., increasing by approximately 1 deg. for every 150 ft. of vertical descent below that level.

The cooling plants use settled water at 95 deg. F., and the motor employs about 30 amps. when operating on 550 v., 50 cycle current.

FOUNDATION ENGINEERING AND EARTH DAM CONSTRUCTION

Three publications issued by Soil Mechanics Ltd., London, are of value to the mining industry in dealing with problems arising in foundation engineering, site exploration, and the construction of earth dams and road embankments. Their respective titles are *Corrosion Surveys*, *The Combined Surface Density and Moisture Meter*, and *The Measurement of Pore Water Pressures*.

A corrosion survey is carried out as part of a complete site investigation with the object of assessing the corrosivity of an environment towards the materials to be used in the construction of the foundation.

A survey usually includes a general appraisal of the geology, pedology, drainage and local peculiarities such as the presence of chemical waste and stray electric currents in the ground. A complete survey includes field and laboratory work: the following procedures are usually adopted: a measurement of the electrical resistivity of the soil using either the surface methods with four electrodes or probing with a two electrode system; measurement of the depolarizing ability of the soil using one or other of the available corrosion probe techniques; selected samples of soil and ground water are taken for laboratory examination and testing.

In the assessment of the survey results attention is paid to the type of structure envisaged and appropriate measures are suggested. For a steel structure this may involve protective coatings and cathodic protection. For a concrete structure it may be necessary to use special cements and mixes.

For rapid preliminary surveys it is economical to use the standard four-electrode system (Wenner) as used in geophysical exploration. In the system four equally spaced co-linear electrodes are used. A low frequency alternating current of known value is fed into the

outer pair of electrodes and the potential difference set up between the inner two electrodes is measured. The ratio of voltage to current is, for a particular spacing between electrodes, proportional to the electrical resistivity of the soil down to a depth related to that spacing. It is possible by varying the spacing of electrodes to detect the presence of any low resistivity layers at depth.

The probe (a two-electrode system), used by Soil Mechanics Ltd., is based upon one developed by the Norwegian Geotechnical Institute at Oslo. It consists of a magnesium-iron cell designed to be pushed into the ground on the end of deep sounding rods. Measurement is made of the equilibrium short circuit current between the iron and the magnesium with the cell in a fully polarized condition. The resistance across the cell is also measured by a high-frequency bridge.

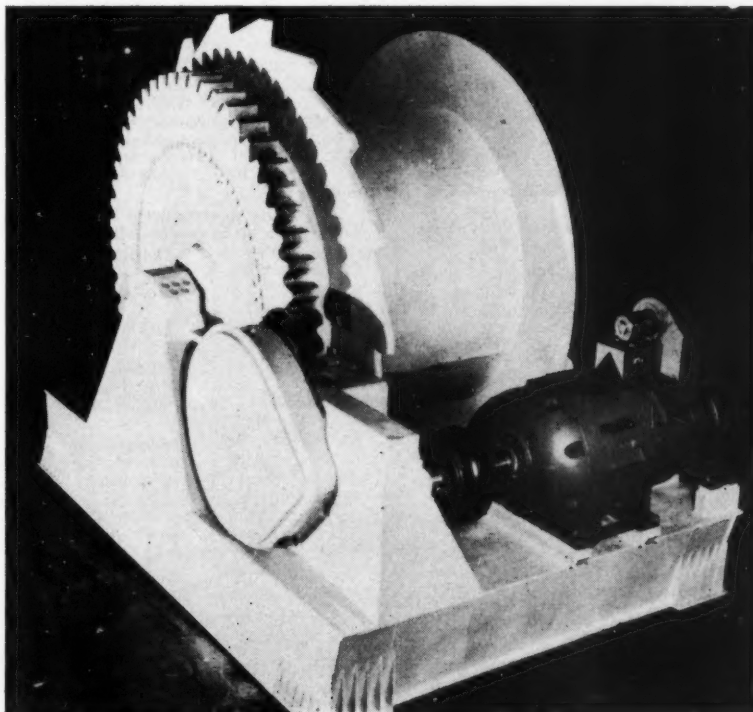
The product of the short circuit current and the cell resistance is termed the effective E.M.F. of the cell and is compared with that obtained by immersing the cell in an aerated, saturated brine at laboratory temperature. The resistance across the cell is calibrated in terms of

resistivity of the soil in which it has been immersed; a final assessment of the corrosivity of the soil takes into account both the ratio of the effective E.M.F. in the soil to that in the brine (expressed as a "percentage depolarization") and the resistivity of the soil. A scale of corrosivity has been established for marine clays.

A combined surface density and moisture meter, using nuclear techniques, has been developed by Soil Mechanics Ltd., in association with Dynatron Radio Ltd., to assist in the control of soil compaction. It is of particular importance in the construction of roads, airfields and earthdams, where it is necessary to determine the dry density of the material being compacted.

The main feature of this equipment is that a single operator can obtain an immediate and accurate determination of the *in situ* dry density. It is possible, with both density and moisture content, to achieve an accuracy of 1.5 per cent. The time taken to complete both measurements is less than 5 min. The equipment consists of a unit incorporating the density and moisture measuring systems, and a transistorized scaling unit.

An ultra heavy-duty, single drum electric winch capable of developing more pull than that produced by four standard 1,200 h.p. railroad locomotives, has been designed and built by R. G. LeTourneau, Inc., United States. The winch, designed for specialized applications where unusually heavy single line pull is required, develops 300,000 lb. line pull and is capable of holding 900,000 lb. without slippage. It is 10 ft. wide, 17 ft. long and 12 ft. high. In addition, the winch has a 7-ft. dia. cable drum which holds 3,000 ft. of 2½ in. dia. wire rope. A 200 h.p. electric motor furnishes power through an oil bath gear train which meshes with a 9-ft. dia. final drive gear bolted to the cable drum.



The density of a soil is proportional to the number of atoms per unit volume. When a radioactive source emitting gamma rays is placed in a soil the gammas collide with the electrons in the atoms, lose energy and are ultimately absorbed. If a gamma detector is placed at a fixed distance from the source, the gamma intensity reaching the detector is inversely proportional to the soil density.

In practice the source is housed in a probe which penetrates the ground to a fixed depth, and the gamma intensity is detected by a Geiger Müller tube at the surface. In soils that are too compact to permit penetration of the probe without undue disturbance, the unit can be operated with the gamma source at the surface. In this latter method the density of the soil is proportional to the intensity of the gammas scattered back from the soil.

Fast neutrons emitted from a radioactive source in a soil are slowed down by collision with the nuclei of hydrogen present in the soil moisture. If a slow neutron detector is placed at a fixed distance from the source, the intensity of slow neutrons reaching the detector is proportional to the moisture content.

In practice a fast neutron source is placed on the ground surface and the

Considering pore-water pressures, pore water is defined as the free water which is present in nearly all soils. Under normal conditions the pressure of the pore water at any point is hydrostatic, corresponding to the depth below the water table.

When an embankment is placed upon a saturated soil the pore-water pressure will rise above the natural hydrostatic head. In time, equilibrium will be re-established, but as the rate of dissipation of the excess pressure will depend upon the permeability of the soil there may be, in the case of a fine-grained soil, a long interval before the pore-water pressure falls once more to that corresponding to the natural head. Similarly within the material of the embankment itself, excess pore-water pressure may develop under the weight of the fill, particularly where the rate of placing is high and where the soil as placed is wetter than the optimum moisture content.

Since pore-water pressure reduces contact pressure between adjacent grains of the soil, it also thereby reduces frictional resistance to shear and consequently reduces the stability of the embankment.

The relationship between pore-water pressure and shear strength is given by the equation:

$$S = c' + (\sigma - u) \tan \phi'$$

where S denotes shear strength

c' ..	apparent cohesion	}	effective-stress shear-strength parameters
ϕ' ..	angle of shearing resistance		
σ ..	total stress		
u ..	the pore pressure.		

intensity of slow neutrons scattered back from the soil is detected by a boron trifluoride proportional counter placed alongside the source.

The measuring unit contains both the density and moisture measuring systems. The density system comprises a caesium source contained in the end of a stainless steel probe, and a G.M. tube. The moisture system consists of a radium beryllium source, a BF₃ proportional counter, and a transistorized E.H.T. and preamplifier assembly. The complete unit is housed in a light alloy hammer-finished case, provided with carrying handles and strap. The sources are shielded by lead and heavy alloys to comply with safety requirements. A locking device is fitted to the probe so that the caesium source cannot be accidentally exposed or removed.

The scaling unit is a completely portable Dynatron scaler. The circuit comprises five counting display tubes fed by transistors enabling a total of 10⁵ counts to be registered. The unit includes a stabilized voltage for the G.M. tube, a test pulse generator and a built-in timer. The complete unit is contained in a steel case with a hammer finish and provided with carrying straps. Power is supplied by a compact rechargeable battery enabling ten hours continuous operation.

The measuring unit is bedded on the soil surface and the probe pushed into the soil to a fixed depth. The unit is connected to the scaler and a count taken for a set period monitored by the timer. Counts are made with the scaler switched first to Density and then to Moisture. The bulk density and moisture content in lb./cu. ft. can be determined from the calibration curves provided. By subtraction the dry density can be obtained immediately.

For a given total stress σ , the shear strength can be seen to be directly dependent on the pore pressure.

Hence it is extremely important to measure accurately, and at regular intervals, the pore pressures during construction, and in some cases during subsequent drawdown of reservoir water-level, primarily to ensure that pore pressures do not exceed the values assumed in the design calculations. The design values, in fact, become the permissible pore-water pressures.

The pore-water pressures in an embankment are measured by means of cells; each cell is fitted with a porous disc which is buried in the fill at suitable points.

These cells are connected by means of plastic tubes to a gauge station which is equipped with de-airing apparatus and pressure gauges.

NEW TESTING INSTRUMENT

The new Series 3 Megger instrument just put on the market by Evershed and Vignoles Ltd., incorporates many advanced features.

A true ohmmeter movement makes any adjustment before use unnecessary, and simplifies operating procedure so that the instrument, which is calibrated with international markings, may be used anywhere in the world by personnel of all levels of technical training.

In addition to the insulation testing range, the instrument now operates over a continuity range from 0-100 ohms with a scale shape which permits readings as low as 0.1 ohm, or even fractions of this by interpolation. The continuity testing voltage (4 volts) is obtained from a new and very advanced miniature genera-

tor so that no battery is required and constant readiness for use is ensured.

One of the noticeable benefits is the considerable reduction in effort required to turn the generator handle. This has been achieved by use of inherent characteristics of the generator and the measuring circuit inputs, by which it was possible to dispense with a separate stabilization network and thus reduce the load on the generator. A clutchless nylon gear train transmits the handle torque to the generator and provides remarkably smooth and consistent operation.

Three ranges of the instrument are available, the 500 volt testing pressure version covering 0-100 megohms and infinity on the insulation range and 0-100 ohms on the continuity range; the 250 volt version 0-50 megohms and infinity and 0-100 ohms; and the 100 volt version 0-20 megohms and infinity and 0-100 ohms.

A NEW TRACTOLOADER

The TL-14 Tractoloader manufactured by the Allis-Chalmers Manufacturing Co., United States is now being built in Britain. Known as the BTL-14D Tractoloader, this machine is being produced in quantity by Allis-Chalmers Great Britain Ltd. at their Essendine Plant.

The BTL-14D Tractoloader is a four-wheeled, rubber tyred loader capable of fast digging, lifting, carrying and dumping of soils, sand, gravel, coal, shot rock, etc. Power reversing tractomatic transmission with a lever on the steering column to control both forward and reverse movement without stopping the machine to clutch and shift gears, is one of the features of this new Tractoloader. This lever hydraulically engages the two multiple disc dry type clutches, one for forward travel, and the other for reverse. The use of two clutches prolongs clutch life.

Four speeds forward are provided to 22.3 m.p.h. and four reverse speeds to 29.3 m.p.h. Reverse speeds are approximately 30 per cent faster than the forward speeds in the same gear. This design permits a faster loading cycle without shifting to a higher gear to achieve the same effect. Transmission, coupled with the BTL-14D large single stage torque converter having a 3 to 1 ratio, assures correct operating speeds for every job and condition.

The BTL-14D Tractoloader is equipped with the A.E.C. AV. 312 87 h.p. diesel engine. Shipping weight of the loader is approximately 14,900 lbs. Various bucket sizes are available for the unit, ranging from 1 to 3 cu. yds. capacities. Standard bucket size is 1½ cu. yds. Choice of buckets depends upon the weight of the material to be carried, and the working conditions. Bucket tip-back at carrying height is 47 degrees, and there is up to 18,800 lbs. of breakout force at the cutting edge. The hydraulic system is fully enclosed and protected. Hydraulic oil is triple-filtered to remove foreign material by full-flow micron, magnetic and wire mesh filters.

Maximum dumping clearance under the cutting edge is 8ft. 3ins., under the hinge pin it is 10ft. 5ins. at maximum dumping height, reach from the front of the tyres to the cutting edge is 2ft 10½ins. Turning radius of the BTL-14D is 18ft. 11ins with the bucket in carry position.

MINING MISCELLANY

Negotiations between Assam Sillimanite of India and the International Finance Corporation have resulted in the I.F.C. deciding to invest \$U.S.1,365,000 in the Indian concern—a producer of sillimanite, magnesite and kyanite. The American investment will help finance the erection of a plant with an annual capacity of 46,000 tonnes of fireproof minerals, the total cost of the plant being given as \$3,250,000. The U.S. investment is equal to the amount of foreign currency saved by India after only two years' operation of the plant.

The first full time course in nuclear engineering in Australia is planned to begin at the University of N.S.W. this year. The course, lasting about a year, will be open to about 10 graduates in engineering or physics, and is intended to train them to design and operate nuclear power stations.

A 1,000 ton-per-day asbestos mill is under construction at the ABC open pit mine of Clute Corp., near Napa, California, reports the *Mining Congress Journal*. The mill, scheduled for completion in August, is being built in four 250 ton-per-day capacity units, and will process ore by a dry milling method, using air pressure for movement, separation and product classification. Pilot plant studies with this method report asbestos fibre recoveries up to about 23 per cent, compared to industry recoveries of from six to ten per cent. The Napa asbestos ore reserves are claimed to be the largest in the U.S., recent geological surveying disclosing about 4,000,000 tons of proved ore, 7,000,000 of probable and 200,000,000 of possible ore reserves.

Mr. Vance Bland of the Development Loan Fund has been visiting Turkey for discussions with the prime minister, foreign minister and M. Isik of the Economic Division of the Ministry of Foreign Affairs in connection with the proposed iron and steel works at Ereğli on the Black Sea. Turkey also reports that the government has agreed to exports of boracite to the U.S. in exchange for surplus wheat on terms similar to those arranged for chromite exporters. The Turkish chrome industry is still working below capacity. Etibank is reported to be ready to start exploitation of wolfram deposits at Bursa at Uludag, but it may be recalled that similar reports have appeared in past years.

Japan may have to import between 200,000 and 300,000 tons of bituminous coal from the U.S. and elsewhere, if the present protracted walkout at the Mitsui mine at Misik, Kyushu Island continues indefinitely. The strike started in February, and Japan has already imported 100,000 tons of coking coal from Australia. The situation has been made worse by insufficient rains, resulting in power plants reductions. The miners are striking in protest against a management plant to reduce staff and mechanize production to cut losses.

The Newfoundland Government has signed an agreement with Mr. M. J. Boylen of Toronto, president of Advocate Mines Ltd., to develop rich copper deposits in Green Bay. One of the four properties concerned contains an estimated \$10,000,000 worth of copper ore.

Kennecott has ceased asbestos production in the Kozani area of northern Greece.

A Japanese mining group, Sumitomo, has put down \$100,000 as an option on a 5,600-ton mill with the Manitou-Barvue Mines Ltd., for the Bethlehem Copper Co., which has property in Highland Valley, near Merritt, 120 miles N.E. of Vancouver. The mill had been operated for four years on a Barvue property in Quebec, which suspended work in September, 1957. Sumitomo is to decide by February whether to put between \$7,000,000 and \$9,000,000 into the Highland Valley property. If the mine goes into production, the first 10 years' output will go to Sumitomo.

The British Government's Export Credits Guarantee Department has suspended cover for the time being on new business with the Congo Republic, in view of the present disturbances. Policyholders remain covered on existing business; those with "contracts" type policies are covered on all contracts already placed, whether goods have been shipped or not, and those with "shipments" type policies are covered on all shipments already made.

A giant Marion stripping shovel will shortly operate at the United Steel Co.'s opencast iron ore mine at Colsterworth, near Grantam, Lincs. The 2,000,000 lb. machine, which is being supplied by Blackwood Hodge, will be the largest stripping shovel in use outside the American continent. It has been designed by the Marion Power Shovel Co., United States. Part of it will be constructed by the designers and part by Babcock and Wilcox, Ltd., at their Dalmuir Works in Scotland. All assembly on site will be carried out by Blackwood Hodge. The type 5323 will cost approximately £500,000, and will move 600 yds. of earth per operating hour



Extensive reserves of mica are reported to have been discovered in the mountains of the Kordofan Province of the Sudan.

A new scheme for the award of higher national diplomas in metallurgy has been arranged by the Ministry of Education in conjunction with the Iron and Steel Institute, the Institution of Mining and Metallurgy, the Institute of Metals, and the Institution of Metallurgists. The diplomas will be awarded on the successful completion of approved three-year sandwich or full-time courses. Rules 111 (1955) which set out the arrangements and conditions for the award of National Certificates in Metallurgy have been revised to include particulars of the new scheme.

An Anglo-German consortium has initialled an agreement of about £70,000,000 to build a big integrated steelworks at Azna in Northern Persia. The British partners are the Metallurgical Equipment Export Co., and Taylor Woodrow, while the German partners are headed by Demag and Krupps. Besides the steelworks, which will have an annual capacity of 300,000 tons, the project includes an iron ore mine and a town for 10,000 inhabitants. MEECO will be responsible for about one-third of the deliveries to Azna. Final contracts are expected to be signed within a few weeks, so that preliminary work begins at latest in 1961, the entire project to be completed possibly by 1965.

SURVEY OF CANADIAN MINING PROJECTS

The Northern Miner of Toronto published on June 30 last the table which we reproduce below. This summarises the mining capital investment projects currently in hand or in prospect across Canada. These are estimated by our contemporary to involve an expenditure in excess of £500,000,000.

NEW PLANTS UNDER CONSTRUCTION:

COMPANY	CAPACITY (tons per day)	PRODUCT	REMARKS
ATLANTIC COAST COPPER	1,000	Copper	Building mill, with start of production scheduled for early 1961.
CONSOL. HALLIWELL	1,500	Copper	Building mill, and establishing mine.
CONSOL. SMELTERS	—	Iron-steel	\$20,000,000 plant being built at Kimberley, B.C. for production from tailings at Sullivan concentrator.
H. G. YOUNG MINES	—	Gold	Planning production at rehabilitated Starratt mill.
INTERNATIONAL IRON	3,200	Iron ore	Building open pit mine, concentrator, and deep sea harbour.
INTERNAT. MINERALS	2,200	Potash	Major potash mining and processing plant nearing completion.
INTERNAT. NICKEL	6-10,000	Nickel	Establishing mine, mill, smelter and refinery at Thompson, Man., with production to start mid-1960. Overall cost \$175,000,000; 1960 expenditures \$65,000,000.
IRON ORE CO. OF CANADA	50,000	Iron ore	Building branch railway, open pit mine and concentrator to produce 7,000,000 tons of iron ore concentrates annually at Carol Lake mine, Wabush Lake area.
MASTODON ZINC	200	Zinc	Starting production; rate being stepped up to 200 tons.
QUEBEC CARTIER	60,000	Iron ore	Building harbour, railway, two terminals, open pit mine and concentrator to produce 8,000,000 tons of concentrates annually. Estimated cost \$300,000,000; production to start 1961.
QUEBEC LITHIUM	—	Lithium	Building refinery.
SHERBROOKE METALLURG.	—	Zinc, sulphur	Building zinc roasting plant and sulphur acid plant at Port Maitland, Ont., with production to start mid-August, 1960.
WABUSH IRON CO.	—	Iron ore	Installing pilot mill, Wabush Lake area, Quebec, as step toward production.

PLANT EXPANSION AND NEW MINE PROGRAMMES:

CAMPBELL CHIBOUGAMAU	—	Copper	Preparing Henderson mine for production early 1961; arranging for start of production at Kokko Creek mine.
CANADA TUNGSTEN	—	Tungsten	Has budgeted \$500,000 for mine development in 1960.
CAN. COPPER REFINERS	—	Copper, etc.	Completing expansion programme to raise annual capacity to 270,000 tons of copper.
CANADIAN MALARTIC	—	Nickel	Changing part of mill, to permit treatment of Marchant ore.
CONSOL. MOSHER	2,000	Gold	Preparing to mine ore for treatment in MacLeod-Cockshutt mill.
CONSOL. VAUZE	400	Copper	Preparing to establish mine, with ore to be shipped to mill of Waite Amulet Mines.
HUDSON BAY	—	Copper, zinc	Coronation and Chisel Lake Mines being put into production.
INTERNAT. NICKEL	—	Nickel-Copper	Open pit mine being established at Clarabelle property, Sudbury area.
MARCHANT	—	Nickel	Preparing to install mining plant; ore to be shipped to Canadian Malartic mill.
NFLD. FLUORSPAR	—	Fluorspar	Arranging to increase output by 40 per cent.
PORTAGE ISLAND	800	Copper	Preparing mine for shipment to Copper Rand mill.
PRONTO URANIUM	500	Copper	Preparing to mine and mill Pater copper deposit.
QUEBEC I. & T. CORP.	—	Titanium-Iron	\$5,000,000 programme of expansion in progress to increase production.

NEW PLANTS PLANNED OR PROPOSED:

ADVOCATE MINES	3,000	Asbestos	Considering plans for mill construction.
ANACONDA IRON ORE	—	Iron ore	Plans being made for large scale production. Pilot plant operating.
BEAUCÉ PLACER	—	Gold	Plans made to install first placer gold dredge.
BETHLEHEM COPPER	3,000	Copper	Finances being arranged for mill construction.
BRUNSWICK MINING	2,000	Lead-Zinc	Considering mill installation, with concentrates to be shipped to Belgium.
COLUMBIUM M'G	200	Columbium	Considering 200-ton pilot mill.
CONIAGAS	400	Lead-Zinc-Silver	Mill construction planned; start of production scheduled March, 1961.
CRAIGMONT MINES	3,000	Copper	Finalizing plans for mill installation, and mining plant, with large ore tonnage assured.
FALCONBRIDGE NICKEL (1)	2-3,000	Nickel-Copper	Planning mine and major concentrator at Strathcona property, Sudbury area, where large orebody has been indicated.
(2)	—	Nickel	Designing metallurgical pilot plant for testing lateritic ores on property being explored in Dominican Republic.
ITALIA COPPER LTD.	50	Graphite	Considering mill installation.
KAM-KOTIA PORCUPINE	750	Copper	Installing mill for production late 1960.
LABRADOR M. & E.	—	Iron ore	Considering plans for large tonnage mine and concentrating plant, separate from that of Iron Ore Company of Canada, in Wabush Lake area, Quebec.
MATTAGAMI LAKE	3,000	Zinc-Copper	Plans being made for large scale production, with concentrator and possibly smelter.
NORBEAU MINES	400	Gold	Considering mill installation.
NORMANVILLE MINING	—	Iron ore	Considering plans for large scale mining and concentrating plant in Wabush Lake area, Quebec.
PINE POINT MINES	2,000	Lead-Zinc	Waiting decision regarding construction of railway line, before finalizing plans for large scale mining, and mill construction.
QUEBEC SILICA	500	Silica	Considering mill installation.
RIMROCK MINES	50	Lead-Silver	Mill installation planned.
ST. LAWRENCE RIVER	—	Columbium	Considering plans for production at columbium properties owned and controlled in Oka district, Quebec.
SOLBEC COPPER	1,000	Copper	Plans made for mine, and mill construction.

SHAFT SINKING OR DEEPENING IN PROGRESS:

COMPANY	DEPTH (in ft.)	REMARKS
ASARCO (BUCHANS)	1,500	Deepening MacLean shaft to 3,525 ft.
CONSOL. DISCOVERY	700	Main shaft being deepened to 4,050 ft., to open four new levels.
CONSOL. SMELTERS	1,200	Development shaft being sunk at Wedge lead-zinc prospect in New Brunswick.
(1)	675	Main shaft being deepened 675 ft. at Bluebell lead-zinc mine, Riondel, B.C.
(2)	750	Sinking shaft to open six levels; cost \$850,000.
CONSOL. VAUZE	400	Deepening shaft from 1,650 to 2,050 ft.
CONTINENTAL POTASH	1,080	Sinking No. 5 Internal Shaft 1,080 ft. below the 23rd level, to open seven new levels.
EAST MALARTIC	1,000	Internal shaft being sunk 1,000 ft. from 3,865-ft. level.
FORTY-FOUR MINES	3,000	Shaft-sinking nearing completion.
INTERNAT. MINERALS	1,200	Sinking production shaft in preparation for production.
MATTAGAMI LAKE	450	Sinking winze from 1,200 to 1,650-ft. horizon.
NICKEL M. & S.	500	Carrying out \$1,000,000 shaft renovation project.
POTASH COMPANY	900	Deepening shaft on North American Rare Metals property to 1,200 ft.
RIO TINTO	750	Sinking new internal shaft from 24th to 30th level.
SIGMA MINES	750	Shaft sinking started.
SOLBEC COPPER	600	Deepening main shaft to open four new deep levels.
UPPER CANADA	500	Deepening main shaft.
WILLROY MINES	500	

SHAFT SINKING OR DEEPENING PROPOSED:

CAMPBELL CHIBOUG	1,600	To sink internal shaft at main property, extending from 2,100-ft. level to 3,700 ft.
COPPER RAND	?	To deepen No. 4 main shaft.
DOMÉ MINES	1,000	Consideration being given to deepening of workings from 4,000 to 5,000 ft.
DUMONT NICKEL	500	Considering shaft on Anglo American Molybdenite property.
HOLLINGER (ROSS)	1,050	Winze being deepened 1,050 ft. to open 7 new levels.
INTERNATIONAL NICKEL	3,000	Production shaft planned at Copper Cliff Offset property, Sudbury area.
LAMAQUE MINES	470	Preparing to sink 3-comp. shaft to open No. 3 mine.
MACASSA	5-600	To deepen winze below the 5,600-ft. level.
MANITOU-BARVUE	500	Shaft in zinc section being deepened 500 ft.
MARCHANT	750	Shaft to be sunk for development and production.
MARITIMES	900	Planning to deepen shaft to 1,970 ft.
MCMINTYRE PORCUPINE	1,000	New Internal Shaft to be sunk 1,000 ft. below present bottom level at 6,825 ft.
NEW HOSCO MINES	2,000	Considering underground work.
NORANDA MINES	1,100	Plans made for depth exploration through new Internal shaft to 8,000 ft. from present bottom level at 6,000 ft.
NORBEAU	1,000	Considering shaft sinking.
ORCHAN MINES	—	Considering underground work.
PREISSAC MOLYBDENITE	600	Preparing for underground development.
RIO ALGOM	1,700	Planning four-compartment production shaft.

Metals and Minerals

Metal Markets and the Congo

Outside of the Katanga it now seems that mining activity in the Congo has not merely come to a halt but to a full stop, and that however effective the United Nations teams may be it will be a considerable time before the vacuum created by the withdrawal of Belgian executives and technicians can be overcome. Meanwhile in the Katanga itself, although mining operations are reported to be picking up, it has yet to be seen whether M. Tshombe's government can resist engulfment in the Congo disaster.

It is a striking commentary on the general condition of excess capacity which exists for many metals, that the events in the Congo should have had so small an effect on the metal markets. Although a major producer of copper, tin, zinc cobalt and crushing board, there seems little prospect of embarrassment to the consumer except in the case of board.

Barring the risk of autumn strikes in Chile, Free World copper productive capacity over the next twelve months is generally estimated at around 200,000 tons which in itself is nearly as much as the total Congo production which last year was around 275,000 tons. Admittedly a cessation of copper shipments from the Congo would be felt mainly on the European market but is difficult to imagine that in such an eventuality, the U.S. authorities would persist in their fatuous restrictions on shipments to Europe which do not conform to their end use requirements. It really is about time that Washington realized that you can't prevent copper or any commodity in which a world market exists, from flowing across the Iron Curtain by refusing to trade without an end use certificate. Under conditions of surplus in Western Europe, any American sale to Europe with or without an end use restriction simply has the effect of freeing a similar tonnage of non-American copper for export. If there is a shortage then the copper will stay in Western Europe anyway.

As regards tin, a prolonged closure of the Congo mines could be embarrassing as production from the Congo and Ruandi-Urundi runs, on the basis of 100 per cent quotas, at around 14,000 tons. Accumulated mine head stocks from other producing countries might take care of this for perhaps six to twelve months, but thereafter this production would have to be made good from other areas and might take a lot of doing. In the short term, of course, a stoppage of Congo production should present no problem as the pipeline period between mine and smelter is up to five or six months whereas minehead stocks could be released from the east or Nigeria and delivered on the London market within about three months.

Zinc (of which the Congo produced about 114,000 tons last year—mostly for the European market) might well create difficulties on the Continent where the trend of consumption continues upwards. However, as the Congo zinc production is less than 5 per cent of the free world total, it would be surprising if producers in other parts of the world—notably Canada and Australia, who have

suffered particularly from U.S. quotas—could not make good this deficiency.

The most immediately embarrassing outcome of events in the Congo is likely to be felt in the market for crushing board of which the Congo produces something over 80 per cent of Free World production in the Kasai where the present situation may well be further complicated by inter-tribal friction. The North American market, which probably absorbs three-quarters of the Congo output, is likely to be the least affected owing to the large strategic stockpiles which exist there together with further accumulations as a result of barter trading. Moreover this is the area of the industrial diamond market in which synthetic production has been developing and a prolonged stoppage of Congo supplies would certainly give a big fillip to this very new industry.

The Congo is by far the world's largest producer of cobalt (about 55 per cent in '59). On the other hand usage was at a very low ebb two years ago and has only recently begun to pick up again, partly as a result of intensive market development projects which could presumably be deferred. In any case there are considerable stockholdings, notably in the U.S., and if the price rose appreciably this would certainly lead to substitution.

TUNGSTEN CARBIDE
BARTER BID

The U.S. Agriculture Department is to barter surplus agricultural commodities on a bi-lateral or multi-lateral basis in exchange for up to 1,100,000 lb. of tungsten carbide powder. Tenders must be received in Washington by August 5, the tungsten concentrates must originate in friendly foreign countries and the processing into tungsten carbide powder must be undertaken in the U.S. The powder would be transferred to the supplemental stockpile.

CLIMAX MOLYBDENUM
STOPPAGE AVERTED

Fears of a molybdenum shortage in face of the threatened strike at the American Climax mine have been allayed with the news of the conclusion of a new two-year wage agreement with the union. Nevertheless offtake in Europe remains at a high level and minehead stocks are not believed to be considerable.

NO CHEER FOR URANIUM

The sixth annual report of the U.K. Atomic Energy Authority offers little encouragement to uranium miners. Point-out briskly that its forecast of a year ago that the forward price of U_3O_8 would fall even lower than \$8 per lb. has already been confirmed by events, it goes on to express the view that "it is now improbable that uranium producers outside the United States will make any

LONDON METAL AND ORE PRICES, JULY 21, 1960

METAL PRICES

Aluminium, 99.5%, £186 per ton	Magnesium, 2s. 2½d./2s. 3d. lb.
Antimony—	Manganese Metal (96%/98%) £275/£285
English (99%) delivered, 10 cwt. and over £190	Nickel, 99.5% (home trade) £600 per ton
per ton	Osmium, £20/£25 oz. nom.
Arsenic, £400 per ton	Osmiridium, nom.
Bismuth (min. 1 ton lots) 16s. lb. nom.	Palladium, imported, £8 12s. 6d.
Cadmium 10s. 6d. lb.	Platinum U.K. and Empire Refined £30 5s.
Cerium (99%) net, £15 0s. lb. delivered U.K.	Imported £28½/28½
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.	Quicksilver, £70/£70½ ex-warehouse
Cobalt, 12s. lb.	Rhodium, £44/£48 oz.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram	Ruthenium, £14/£20 oz. nom.
Gold, 249s. 10½d.	Selenium, 50s. 0d. per lb.
Iridium, £23/£26½ oz. nom.	Silver, 79½d. f. oz. spot and 79½d. f'd
Lanthanum (98%/99%) 15s. per gram.	Tellurium, 25s. 0d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis	20s. 6d./21s. 6d. per unit, c.i.f.
Beryl (min. 10 per cent BeO)	235s./240s. per l. ton unit BeO
Bismuth	65% 8s. 6d. lb. c.i.f.
	18/20% 1s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable 48%) (Ratio 3:1)	£15 5s. 0d. per ton c.i.f.
" Hard Lumpy 45%	£15 10s. 0d. per ton c.i.f.
" Refractory 40%	£11 0s. 0d. per ton c.i.f.
" Smalls 44%	£13 5s. 0d. per ton c.i.f.
Baluchistan 48%	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10:1)	
	Nb ₂ O ₅ : Ta ₂ O ₅ 180s./185s. per l. ton unit c.i.f.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF ₂)	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 34% Li ₂ O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 34% Li ₂ O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li ₂ O	75s./85s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£23 0s. d/d
Manganese Ore Indian—	
Europe (46%/48%) basis 67s. 6d. freight	73d./75d. c.i.f. nom.
Manganese Ore (43%/45%)	69d./71d. c.i.f. nom.
Manganese Ore (38%/40%)	nom.
Molybdenite (85%) basis	8s. 11d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO ₂ (prompt delivery)	£28 0s. 0d. per ton c.i.f. Aust'n
Ilmenite 50/52% TiO ₂	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	156s./162s. per unit c.i.f.
Vanadium—	
Fused oxide 95% V ₂ O ₅	8s./8s. 11d. per lb. V ₂ O ₅ c.i.f.
Zircon Sand (Australian) 65-66% ZrO ₂	£16/£16 10s. ton c.i.f.

substantial new sales of uranium for the next decade" and that such prices as are quoted will be the price for small lots rather than, and will not represent, the true market price. The report does not foresee any recovery in the free market until "some time in the 1970's".

SCRAP BERYLLIUM ELECTROREFINED

A promising new source of high-purity beryllium metal for Space Age needs has been reported by the Bureau of Mines, U.S. Department of the Interior. It is the electrorefining of beryllium scrap, using what is known as the fused-salt technique. The process is claimed to reduce metallic contaminants so that the resulting beryllium reaches a purity of at least 99.5 per cent.

Beads of beryllium were used as an anode in the bottom of a special air-free electrorefining cell of the type devised by the Bureau to refine titanium. Molten salts of potassium, lithium and beryllium served as the electrolyte. Crystals of the near-pure beryllium formed on the cathode "much as rock candy builds up on a string."

The procedure is regarded as offering an encouraging route for recovery of beryllium scrap and possibly for production of a high-purity metal. Its potential importance to the development of high-purity beryllium as an engineering material is clearly very great.

(Report of Investigations 5581, *Electrorefining Beryllium: Preliminary Studies*, by M. M. Wong, F. R. Cattoir and D. H. Baker Jr.).

PLATINUM IN THE FIRST QUARTER

Sales of platinum-group metals to consuming industries in the U.S. in the first quarter of 1960 were 6 per cent lower than in the preceding quarter, but 24 per cent above those of the corresponding period of 1959, reports the Bureau of Mines, U.S. Department of the Interior. Imports of platinum-group metal dropped 1 p.c. below the preceding quarter and 25 per cent below those of the first quarter of last year. No platinum group metals were acquired for the government stockpile under the barter programme.

Domestic consumption of platinum as indicated by sales to consuming industries rose by 10 per cent to 121,086 troy oz.; increases in the chemical, petroleum and electrical industries more than offset decreases in glass and other industries. Palladium sales fell by 16 per cent, due chiefly to lower demand by the electrical industries, which accounted for over three-fourths of the total palladium sold. Sales of the minor platinum-group metals—iridium, osmium, rhodium and ruthenium—aggregated 12,400 oz., a drop of 8 per cent from the fourth quarter of 1959.

Refinery production of platinum (new and secondary) fell to 15,786 oz. in the first quarter, being 32 per cent lower than in the preceding quarter imports of refined platinum (101,700 oz.) rose by one-third. Working stocks of platinum as reported by refiners and dealers dropped 7 per cent during this period.

COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

With the holiday season moving towards its climax and news from the Congo being more reassuring, copper prices have shown a decline but the basic undertone remains steady: the tin market is very firm, while lead and zinc show no change.

COPPER SHOULD REMAIN STRONG

Better news from the Congo, increased L.M.E. stocks, and bearish copper statistics for June, have all tended to bring out a little selling on the market but in general this has been well absorbed and the undertone remains very steady. Advances from the Continent indicate that demand for metal will pick up again immediately the holidays are over, whilst from the U.S. comes news that the general opinion is that, as there has been no break in the copper price up till now, there is every prospect that the present level will be maintained for some considerable time.

A bullish factor is that people are already beginning to talk about the inevitability of a strike at the Chuquimata mine on October 1, and, should this materialize, experience indicates that it will last for at least a month with immediate repercussions on the sterling price in London. At the moment there is a ban on overtime at this mine and during the week there have been minor labour troubles in other places but without serious consequences. Activity on the Exchange has been less but the back-wardation has been maintained in spite of an increase in stocks of 750 tons, bringing the total to 4,485 tons.

The figures issued by the Copper Institute for June give a U.S. production of refined copper of 161,073 tons as compared with 147,050 tons in May with end of month stocks showing a substantial rise at 87,667 tons as against the end of May figure of 65,328 tons. Outside the U.S., production of refined copper totalled 168,651 tons as compared with 176,117 tons in May, whilst end of month stocks increased slightly to 252,405 tons as compared with 247,338 tons at the end of May. Deliveries to fabricators inside the U.S. were about 2,000 tons lower than during May, but outside the decrease was much greater, amounting to about 15,500 tons, and this probably reflects the slowing down of the intake which had been speeded up in anticipation of trouble in the Congo.

EASTERN TIN MARKET ACTIVE

The tin market continues strong and the turnover in the East remains at a high average, whilst that in London varies considerably from day to day. With strong buying of forward metal and an increase in stocks of 319 tons to a total of 9,368 tons, the back-wardation has shown signs of disappearing but this may only be temporary as it is under-

stood that the technical position resulting from deliveries back to the buffer stock has not yet been entirely smoothed out. During the first half of July shipments from Penang totalled 3,021 tons, an increase of some 550 tons over the first half of June and almost exactly double the tonnage shipped during the first half of last year.

On Thursday the Eastern price was equivalent to £826½ per ton c.i.f. Europe.

LEAD AND ZINC LITTLE CHANGED

The lead and zinc markets have pursued an uneventful course but with plenty of European lead still arriving in the U.K., the former market will probably go a little lower. The next major event for both markets should be the Lead Zinc Study Group meeting in Geneva during the first half of September.

The British Bureau of Non-ferrous Metals has published their statistics covering the month of May, the salient figures, with the comparative April figures in parentheses being (in tons): copper consumption, 63,659 (58,678); end of month stocks, 77,808 (59,404). There were no shipments of copper to the U.S.S.R. during either April or May but 400 tons went to China during the latter month. Lead offtake was 33,459 (28,148), with end of month stocks, 45,657 (50,363).

During the month arrivals from Australia were less than half of the April figure, whereas the imports from Spain reached 3,367 tons as against only 486 tons the previous month. Up to May this year nearly 7,000 tons of Spanish lead has been imported. Offtake of zinc totalled 30,848 tons (28,069); end of month stocks totalled 52,470 tons (54,491); usage of refined tin totalled 1,902 tons (1,774); end of month stocks totalled 10,565 tons (10,349).

Closing prices are as follows:

	July 14		July 21	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash ..	£257½	£258	£256½	£257
Three months ..	£249½	£250	£248½	£249
Settlement ..		£258		£257
Week's turnover	11,225 tons		9,375 tons	
LEAD				
Current ½ month	£70½	£70½	£71½	£71½
Three months ..	£71½	£71½	£72½	£72½
Week's turnover	7,475 tons		3,800 tons	
TIN				
Cash ..	£809	£810	£823	£823½
Three months ..	£805	£806	£823	£823½
Settlement ..		£810		£823½
Week's turnover	980 tons		1,430 tons	
ZINC				
Current ½ month	£90	£90½	£91½	£91½
Three months ..	£90	£90½	£90½	£90½
Week's turnover	6,750 tons		6,325 tons	

Mining Finance

Rio Under the Microscope

A remarkable survey of the Rio Tinto organization was issued this week by a leading firm of brokers. It covers in the closest detail every aspect of Rio's interests and in addition contains appendices on, *inter alia*, the U.S. Atomic Energy Commission's stretch-out proposals and the Canadian industry's rationalization plans to meet the new situation. The amount of work that has gone into the survey is prodigious, and it should certainly be read by all investors with an interest, actual or potential, in Rio Tinto or the producing companies of the group.

Briefly, the conclusions reached are; that at the present price of about 30s. 6d. Rio Tinto are standing well below their net asset value, which the survey puts at 65s. per share; and that Rio is no longer a uranium risk, though it would be in a position to benefit from any improvement in the demand picture.

The reasoning behind these two conclusions is unassailable. Indeed, there is a case for arguing that the survey is over-conservative in some places. Mary Kathleen, for example, is taken into the calculations at a value of £5,300,000. Bearing in mind that Tinto's proportion of profits during the contract period should total about £5,000,000 and that in addition it will receive some £1,300,000 by way of preference capital repayments, this value seems distinctly on the low side.

Another possible underestimation in Tinto's value arises from the fact that its Rhodesian copper shares are taken into account at politically depressed value of about £14,250,000. In fact, for an essentially long-term holder like Rio, the true value must be nearer the £21,000,000 at which these shares stood last December. Using this figure instead, Tinto's asset value comes out at almost 69s.

The survey's other conclusion, that Tinto is no longer a uranium risk, is probably the item that will cause most surprise to the non-specialist investor. Those close to the company have realised for some time that the company now stands to lose little on its uranium interests; but this appears to be the first time that an actual statistical analysis has been attempted. Briefly, the survey's calculations indicate that the parent company's proportion of the cash outflow from Blind River up to the end of the contract period should come to £18,000,000. Tinto's investment stands at about £100,000 more than this, so that at the end of the contract Rio will have all the plant and equipment and up to 70,000,000 lbs. of uranium reserves standing in its books at virtually nothing. Against this must be set two factors: during the contract period, Tinto will have earned nothing from its investment; and it is unlikely that the cash outflow from the Blind River mines (and Mary Kathleen) will actually reach the parent company's books, for tax and other reasons.

Nevertheless the point is clear; by buying in Rio Tinto, the investor is backing the judgement of the company in re-investing its funds as they become available and that he is in any event buying the company's assets extremely cheaply.

JANTAR v. BISICHI : SECOND ROUND

The second phase of Bisichi's attempt to take over the Jantar (Nigeria) Company opened this week with a revised bid sent direct to Jantar shareholders followed by a non-recommending note from the Jantar board. A fuller answer is being sent to shareholders today. It will be remembered that Bisichi's first approach was made to the Jantar board, who forwarded the offer together with a letter recommending non-acceptance.

Bisichi have, in fact, amended their terms to take account of Jantar's main criticisms of the original offer. These were that the proposed cash payment — 2s. 6d. per Jantar unit — would deplete the cash resources of the combined company too much, and that the share exchange part of the transaction, which would leave ex-Jantar holders with 20.4 per cent of the new company's capital, did not fairly represent Janta's contributions to the tin and columbite reserves of the new company, which would amount to some 47 per cent.

In fact, the new offer is pitched very close to the ratio between the two companies' net assets and recent profits. Although this may be a fair method in many take-over situations, it would not appear so in this case, if only because Jantar has pursued a most conservative policy in writing down its fixed assets. Moreover, it fails to take

account of factors such as the geological situation, which from a mining company's point of view, may be of paramount importance. Water supply, for example, is almost impossible to value in cash. Yet on the Nigerian plateau it is of transcendent importance — and the fact is that Jantar's water supply is far superior to that of Bisichi. No account is taken of this in the Bisichi offer.

Bisichi's main grounds in making the offer are apparently that it will be considerably more economical to work the two properties as one. In fact, this is unlikely. Tin and columbite mining in Nigeria is largely a matter of a large native labour force with a small amount of supervision, and it is difficult to see where substantial economies could be effected, especially since some of the working areas are widely separated. There could be some economy in London, but this would hardly be significant in relation to profits.

The conclusion is inescapable: the Bisichi offer is not a good one, though on paper it might appear so to the non-specialist investor. Whether the Jantar board can establish this point, however, only time will tell.

MORE GOOD TIN DIVIDENDS

Last week saw the declaration of a further series of good dividends from Malayan Tin mining companies. Outstanding was the payment announced by Malayan Tin, whose big new dredge is now making an important contribution to profits. Malayan announced a third interim payment for 1959-60 of 7½d.

The significance of this is two-fold. First, it brings the total for this year to 1s. 3d., against 4½d. at the same time last year, allowing for the intervening scrip issue; and second, it establishes Malayan

LONDON MARKET HIGHLIGHTS

The almost daily shock reports that have come from the Congo since the outbreak of independence in that country seemed to have almost spent their power of rocking the South African Gold share market last week. Certainly the Congo news remained as disturbing as ever, but its effect on Kaffir prices was slight. The answer, of course, was that buyers and sellers had decided to adopt a "wait and see" attitude and this was underlined by the extremely low level of business passing.

Free State Geduld eased only 1s. 10½d. to 116s. 3d. while gains established by Harmony (29s. 1½d.), President Steyn (22s. 1½d.) and Western Holdings (117s. 6d.) following weekend Press comment were fully maintained up till Wednesday evening. Other Kaffir price changes were mostly made up of small losses.

Coppers did not fare so well, but here again there was no wave of selling. The most active stock was Tanganyika Concessions, a company particularly identified with the Congo as a result of its important holding in Union Minière. "Tanks" made a bad start on Monday with a fall of 2s. to 31s. 6d., but subsequent support—much of it in the form of bear covering—saw the shares recover to 34s. at one time. Similarly, Chartered resisted the dull trend by jumping 2s. to 77s. Nchanga, however, eased back to 56s. 3d. ex-dividend.

A bright exception to the trend was

provided by the return to favour of the Tin group. Apart from the welcome lack of political worries, mining investors were impressed by the strength of the tin price which climbed to £818, its highest since 1956.

Also helping matters was a particularly good second interim dividend from Tanjong. The payment of 1s. made a total for the first two interims to date of 1s. 7½d. and compared with the previous year's total of 2s. which was made up of five payments. Consequently, Tanjong spurted 2s. 4½d. to 27s. ex-dividend at which price they still yield as much as 7.3 per cent on last year's 2s. total. Another good interim came from Gopeng and the shares moved up to 27s. Other useful gains were established in Ayer Hitam (125s.), Sungei Besi (31s. 3d.) and Tronoh (41s. 9d.).

Lead-zincs were steady enough, but news of the strike at Broken Hill which was received on Wednesday evening caused dullness. The labour trouble involves Zinc Corporation and New Broken Hill; Consolidated Zinc controls the former and has a 32 per cent interest in the latter company.

Elsewhere, the latest turn in the seemingly endless legal proceedings in the Pasic claim on Trepan Mines lowered the shares by 1½d. to 4s. 3d. Ashanti Goldfields (18s. 1½d.) also lost 1½d. This followed the unchanged interim but it is doubtful if there was any real disappointment with the payment.

on a firm 7½d. per quarter dividend rate. The sister mine, Southern Malayan, is also established on a 7½d. per quarter rate.

Tronoh Mines in the same group, declared a fifth interim for 1959 of 1s. 3d., making 3s. 1½d. for the year, 1½d. more than officially forecast. The market is going for 4s. 6d. from this company for 1960, and the prospects of this proving accurate look good. Another good payment came from Tanjong. In this case it was a second interim of 1s., making 1s. 7½d. so far. Clearly, with a probable two more interims and a final to come, the least that can be expected from Tanjong this year is a doubling of last year's 2s.

Among the remaining payments were Gopeng: third interim of 6d.; Ayer Hitam: third interim of 1s. 3d.; and Sungei Besi, fourth interim of 3d. per share.

WESTERN DEEPS FINDS RICH V.C.R.

Two interesting borehole results have been announced by Western Deep Levels. The holes were drilled from the 6,200 foot level near the No. 3 shaft and intersected

reef at approximately 6,400 feet and 6,350 feet. The values encountered were 4.98 dwt. over 78.8 inches, or 392 in.-dwt., and 44.59 dwt. over 53.2 inches or 2,370 in.-dwt.

Two points about these boreholes are immediately noticeable—the extremely high in.-dwt. value of the second hole, and the great width encountered in the first intersection. Indeed, the variations, both between these two holes, and between these intersections and the earlier holes on the property, are so great that it is difficult to discern any real pattern. All that can be said is that if values and widths prove to vary as much as this throughout the whole property, Anglo American are going to have to face some nice mining problems.

Twefontein Investment's Portfolio.—At the annual meeting of Twefontein Investments, the chairman, Sir Joseph Ball, said that by June 30, the value of the company's portfolio had declined to £302,500 from the year-end figure of £357,500. Production by Twefontein United, the company's largest holding, in the first half of 1960 was 8 per cent above last year's level.

Full-Scale Shaft Sinking at Harties

Full-Scale shaft sinking starts at Hartbeestfontein No. 4 shaft within the next week or so. The mine admits that it hopes to establish consistently high rates of advance, but outside mining engineers consider that a further big breakthrough may well take place on this property.

An important contributory factor will be the employment of a new type of lashing machine developed by the engineers on the mine and at the Anglovaal head office. Up until now, Hartbeestfontein has employed a hydraulic type, also designed within the Group. Briefly this consisted of a horizontal boom pivoted in the centre of the bottom deck of the sinking stage. From this a 20 cu. ft. cactus grab was suspended from the piston rod of a vertical cylinder, which could be moved along the boom.

Although good performances were obtained, it had certain disadvantages. The unit was not manoeuvrable; the stage had to be kept within 16 ft. of the bottom of the shaft during lashing, which meant that concreting and other operations were hindered; and difficulty was experienced in maintaining an effective seal on cylinders operating at 250 p.s.i. In addition, with some units of the grab being below the bottom deck of the stage, they were liable to be damaged by blast. The horizontal boom was not supported at the end and large forces had to be taken by the centre pivot; consequently the grab capacity could not be increased above 20 cu. ft.

The new lashing machine is operated by compressed air. Basically, it consists of a vertical column extending from the second lowest deck of the stage through the bottom deck. Below this is the horizontal boom operating the grab and at the bottom of the column is the driver's cabin.

All the vertical load is carried on a ball thrust bearing on the upper deck and off-centre loading is carried laterally by a roller bearing on the bottom

deck in which the large rollers can be replaced during operations if need be. Rotation of the unit is achieved by a 14 h.p. air motor on the top of the main column.

The radial movement of the boom is provided by two cylinders—one of them a standby—mounted inside the boom. Should both these fail a small air-driven winch can take over.

Instead of the grab being mounted on the end of a vertical cylinder it is suspended by rope which is controlled by a cylinder mounted in the vertical column. If this latter should fail, a small lashing winch using the same rope can take over. The main purpose of this winch, however, is to vary the distance between the bottom deck and the shaft bottom by reeling in or paying out rope. In consequence the stage can be moved within the shaft without interfering with cleaning operations. It also can bring new rope into operation, should any wear take place, by unreeling from a storage drum.

As a result of the improved support for the unit, a 30 cu. ft. grab will be used for lashing—against the 20 cu. ft. units used in almost all sinking work in South Africa to date. Complementary to this, 14-ton kibles will be used in place of the 10 tonners so far employed. On the basis of tests done, using an air pressure of 90 p.s.i. it should be able to load these kibles in 90 secs.

This should go far to cut down the cleaning time which at present occupies more than half of each sinking cycle. During Vaal Reefs' record runs the average round took 5 hours 15 minutes of which 2 hours 45 minutes was attributed to cleaning. Engineers who have seen the grab undergoing tests on surface take the view that the new cleaning unit could cut this to around two hours. A saving of this order, would alone make possible a sinking rate of around 1,200 ft./month without taking into account any other savings of time or improvements in existing methods.

Publication Re

Mineral Deposits in Northern Rhodesia. Bulletin No. 5, published by the Ministry of Labour and Mines Geological Survey, Northern Rhodesia, (price £2 2s.) describes the Carbonatites of the Refunsa Valley, Feira District. The author is D. K. Bailey. These carbonatites are remarkable in that they occur in circumstances suggesting that they constitute a carbonatite "province", and in that the largest of them occurs in a form not previously identified in any other of the African occurrences, that of a layered, concordant intrusion or sill, and of a size unequalled, so far as is known, anywhere else. The circumstances attending these occurrences have enabled the author to postulate an explanation of their origin and mode of occurrence.

The bulletin also contains a detailed assessment of the economic potential of the occurrences, particularly that of the largest one, Kaluwe, as a low-grade but large source of niobium and, additionally, of phosphates in the form of apatite. There is a reasonable possibility that these carbonatites represent an economic asset to the Territory, of which good use might be made at some future date.

In Northern Rhodesia Geological Survey Occasional Paper No. 3, W. H. Reeve and T. Deans, give a preliminary account of an occurrence of carbonatite in the Isoka district, where a prominent hill called Nkumbwa, shown as limestone on previous geological maps, has been recognised as a carbonatite plug, the first to be recorded between Kenya and Southern Nyasaland. Previous accounts of the hill are summarized. The carbonatite consists of dolomite and ankerite or siderite, and contains apatite and various accessory minerals. Economic interest centres in the pyrochlore, which is a pale yellow variety containing 73 per cent Nb₂O₅. The first samples suggested that appreciable tonages of both rocks and soils containing more than 0.25 per cent pyrochlore are present, and warranted a more detailed investigation of the deposits, which began in October, 1952. Results will be published later.

"Copper Deposits and their Environment in Northern Rhodesia" is the subject of a paper by P. L. A. O'Brien published by the Northern Geological Survey Department as Occasional Paper No. 24. The descriptions of the smaller occurrences are mainly based on *Guernsey's Mineral Occurrences in Northern Rhodesia* and his unpublished works.

In Occasional Paper No. 23, issued by the same department, K. A. Phillips suggests a line of approach in Northern Rhodesia to the commonly inter-related problems of granitization, metamorphism and metallization. The title of the paper is "A Regional Outline of Certain Metalliferous Zones and their Bearing upon some Problems of Granitization in Northern Rhodesia."

★

A very comprehensive survey of statistics of the mineral industry in France, Algeria, and French Overseas Territories compiled by the Bureau de Documentation Minière, is now available for the year 1957.

Received

A Geological map of Tanganyika on the scale of 1:2,000,000 constitutes Part II of Memoir No. 1 "Summary of the Geology of Tanganyika." The separate parts of this Memoir are being published as they are completed, and will be revised independently of each other. Some apparent anomalies and inconsistencies between the different parts are therefore bound to arise. The present map shows a number of differences from the information contained in Part I, "Introduction and Stratigraphy." It also foreshadows to some extent information to be contained in later parts. Printed by the Government Printer, Dar es Salaam. Price 5s.

Bulletin No. 30 of the Geological Survey of Tanganyika (price 5s.) is a preliminary report of a microfloral investigation of the Lower (K2e) and Upper (K2e) coal-bearing beds of the Lower Coal Measures of Tanganyika. The data presented are of immediate interest in a determination of the age of these measures with respect to the standard European succession and to other similar successions in the Southern Hemisphere.

Reprints of the following papers have also been received: "Summary of Silicate Rocks Associated with Carbonate Bodies in Tanganyika," by T. C. James; "The Geological Environment of Copper Deposits in Tanganyika," by J. K. Whittingham; "East-Central Regional Committee for Geology, Sub-Committee on Stratigraphical Nomenclature," by A. M. Quennell; "A Preliminary Note on the Quaternary Geology of Tanganyika," by R. Pickering; "The Environment of some Copper Deposits near Mpanda, Tanganyika," by A. P. Fawley; and "Charnockites in Tanganyika and their Associated Rock Groups," by A. E. Wright and T. C. James.

This Bulletin, *Geology of Savusavu Bay, West Vanua Levu*, is the first of a series describing the geology of the 16 quarter degree sheets covering Vanua Levu, the second largest of the Fiji Islands. The Nasavusavu West area was selected primarily because of its link through the once productive Mount Kasi gold mine, with mining operations in the Yanawai region, and for bauxite possibilities. New zones of pyritization have been located, and future prospecting work is directed to the faulted areas adjacent to the andesite plugs; although it is suspected that the east-west faults are less likely to be mineralized. For its extensive development, bauxite generally requires larger planar surfaces; therefore, in an otherwise well dissected country, the Wainunu plateau to the west, which forms an unusual feature when viewed from the old Mount Kasi workings, became of immediate interest. A reconnaissance made shortly afterwards proved the presence of bauxite, soon to be investigated in greater detail.

A booklet, *Loans at Work*, illustrates the variety of development projects being assisted by World Bank loans in many parts of the world, many of which are of direct or indirect importance to the mining and metal industries.

IDRIS HYDRAULIC TIN

The forty-sixth annual general meeting of Idris Hydraulic Tin, Ltd., was held on July 13 in London.

Mr. A. G. Glenister, C.B.E., Chairman, presided.

The following is an extract from the Chairman's statement:—

The profit for the year 1959 after charging taxation, amounts to £8,741. A dividend of 1½d. has been paid in respect of the year and the Directors recommend a Final Dividend of 1½d. leaving a balance of £19,880 to be carried forward.

A further special cash distribution of 1½d. per 1s. share (on an Issued Capital of £24,000) on account of the capital profit arising from the Sale of the Kranji Section was made on September 22, 1959.

In October, 1959, the sum of £72,000, a part of the General Reserve, was capitalized, by issuing shares of that nominal amount, credited as fully paid. Shareholders were allotted three new fully paid shares of 1s. each for every one share held by them. The shares of 1s. each were consolidated into shares of 2s. each and the Issued Capital now stands at £96,000.

Compulsory contributions to the Buffer Stock ceased on August 27, 1959, and, by that date, the total contributions amounted to £21,231. Assets to that extent are virtually frozen, until such time as the Buffer Stock may be wholly or partly liquidated.

As yet, no information is available regarding the treatment of the existing Buffer Stock when the present International Tin Agreement comes to an end in 1961. It is your Board's view that, whatever arrangements may be necessary to provide a Buffer Stock under any new Agreement, producers are entitled to look for the repayment of the whole, or at least a very substantial proportion, of the extremely large sums which they alone (in addition to the heavy degree of restriction of output they have suffered), have been compelled to contribute to the maintenance of a price level and availability of stocks which are as much, if not more, to the benefit of consumers as of producers.

ASHANTI GOLDFIELDS CORPORATION LIMITED

Notice is hereby given that the Board of Directors have to-day declared an Interim Dividend (No. 127) on the Issued Capital of the Corporation at the rate of 2.4d. per Share, less Income Tax at 7s. 9d. in the £. This dividend which is in respect of the year ending September 30, 1960 to be payable on and after September 13, 1960 to all Shareholders on the Registers on July 22, 1960.

The Transfer Books will be closed from July 23, 1960, to August 1, 1960, both dates inclusive, for the preparation of Dividend Lists.

By Order of the Board,
E. W. MORGAN, Secretary.

Registered Address:
10 Old Jewry, London, E.C.2.
July 19, 1960.

During 1959, the Company's quota varied between 42.93% and 62.55% of assessment. For the quarter which ends on June 30, 1960, the rate is 81.41%.

Of the 365 days of 1959 it was necessary to cease productive mining operations on no less than 249 days in order to keep the production within the limitations allowed.

The assessments of all the individual Malayan mines are now in the process of revision, and the revised assessment of your mine will, as from July 1, 1960, be 5,897 piculs, as compared with the assessment up to the end of June of 3,000 piculs, and it is anticipated that the level of International quotas will be at a higher average level in 1960 than was the case in 1959.

Although, no doubt, a number of mines will have their assessments reduced, it is probable that a greater number will have their assessments increased; accordingly the total Malayan domestic assessment is likely to be increased and to become even greater in relation to Malayan permissible exports.

It has been announced in the Press that the Conference of Tin Producing and Consuming Countries, sponsored by the United Nations, has approved a new International Tin Agreement which, if ratified by at least 15 Member Countries (of which, not less than 9 must be Consumers), will be effective for 5 years from July 1, 1961.

It is reported that the present floor and ceiling tin prices of £730 and £880 per ton remain unchanged and that the Buffer Stock is to be reduced from the equivalent of 25,000 tons to the equivalent in metal and cash of 20,000 tons.

Japan and Western Germany, which are not signatories to the existing Agreement, are said to be willing to join the new one but the United States and Russia are apparently again to remain outside it. It is sincerely to be hoped that the United States will continue its present "benevolent" policy towards the Agreement and that Russia will agree to a very substantial limitation of her exports.

BIBIANI (1927) LIMITED

Notice is hereby given that the Board of Directors have to-day declared an Interim Dividend (No. 43) on the Issued Capital of the Company at the rate of 1s. per Share, less Income Tax at 7s. 9d. in the £. This Dividend which is in respect of the year ending September 30, 1960 to be payable on and after September 13, 1960, to all Shareholders on the Registers on July 22, 1960.

The Transfer Books will be closed from July 23, 1960, to August 1, 1960, both dates inclusive, for the preparation of Dividend Lists.

By Order of the Board,
E. W. MORGAN, Secretary.

Registered Address:
10 Old Jewry, London, E.C.2.
July 19, 1960.

Personal

Mr. Richard Wood, Minister of Power, announced in the Commons that there will be two deputy chairmen of the National Coal Board from October 1, the date on which Mr. Alfred Robens is due to join the Board. The present deputy chairman, Sir Joseph Latham, who is retiring at the end of August for health reasons, will be replaced by Mr. E. H. Browne, chairman of the West Midlands Division. Mr. Robens will also rank as a deputy chairman until he takes over from Sir James Bowman as chairman on January 31.

★

The appointment is announced of Mr. Victor Manfre as director of foreign operations for Marion Power Shovel Co.

OBITUARY

The death was announced of Mr. Philip Rabone, A.R.S.M., D.I.C., M.I.M.M., at his home on July 10, at the age of 70. Mr. Rabone was a graduate of the Royal School of Mines, and was a member of the Council of the Institution of Mining and Metallurgy from 1946/47, and in 1958 was elected a Fellow of the Imperial College of Science and Technology. His book on Flotation Plant Practice which first appeared in 1932, achieved its fourth publication in 1957. Mr. Rabone was for many years in charge of the General Electric Co.'s mineral dressing laboratory, and later was appointed to the government metallurgy laboratory in Johannesburg. In 1957 he was responsible for the General Electric Company Engineering Group's technical literature relating to the mining field. He leaves a widow and three children.

★

The death is announced of Mr. R. J. Agnew, director of Gold Fields Australian Development Co., who died in Australia on July 1.

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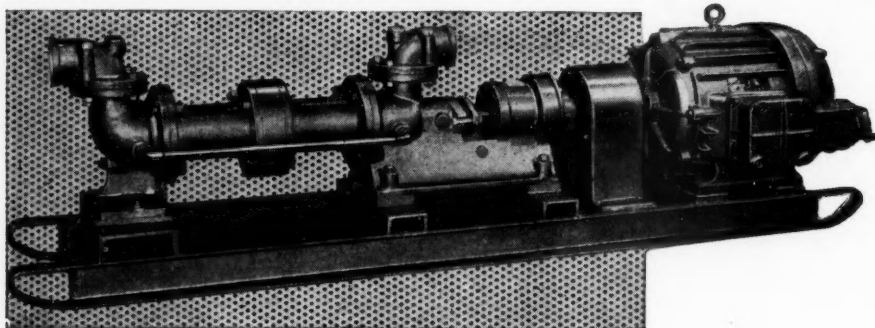
"M.J." SEEKS EDITOR

As part of a gradual redistribution of editorial appointments to its three publications, *The Mining Journal* wishes to engage an additional experienced journalist next January or sooner with a view to his assuming the Editorship of its international weekly in the latter part of 1961.

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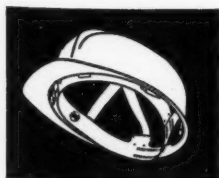
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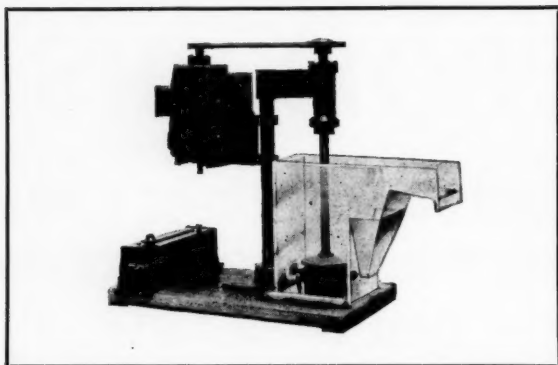
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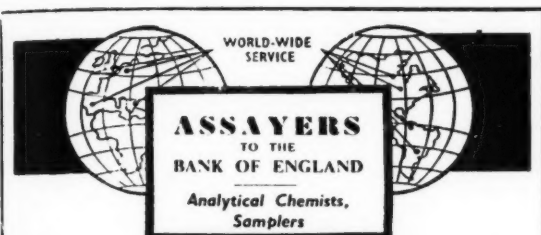
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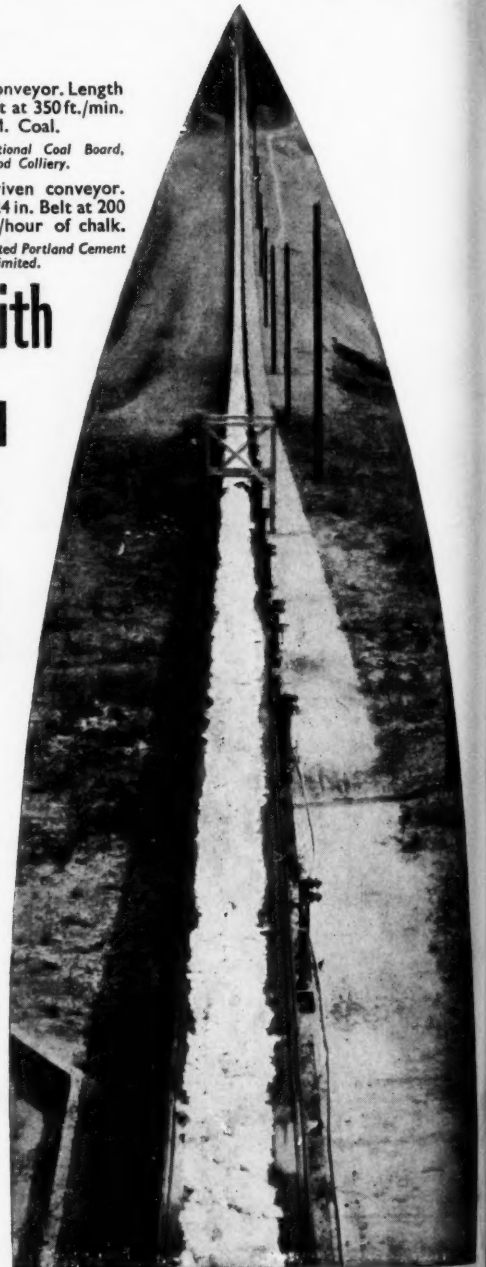
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